

Report No. CG-D-11-98

# **A Brief History of United States Coast Guard Hazardous Materials Management**

**Michele Fitzpatrick**

United States Coast Guard  
Research and Development Center  
1082 Shennecossett Road  
Groton, CT 06340-6096

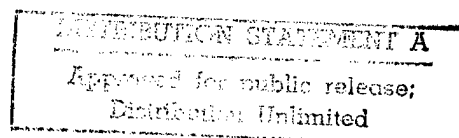


Final Report  
February 1998

This document is available to the U.S. public through the  
National Technical Information Service, Springfield, Virginia 22161

Prepared for:

U.S. Department of Transportation  
United States Coast Guard  
Systems, (G-S)  
Washington, DC 20593-0001



19980604 037

# NOTICE

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

The contents of this report reflect the views of the Coast Guard Research & Development Center. This report does not constitute a standard, specification, or regulation.



Marc B. Mandler  
Technical Director  
United States Coast Guard  
Research & Development Center  
1082 Shennecossett Road  
Groton, CT 06340-6096

1. Report No. CG-D-11-98		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle A Brief History of United States Coast Guard Hazardous Materials Management				5. Report Date February 1998	
				6. Performing Organization Code Project No: 4122.2	
7. Author(s) Michele Fitzpatrick				8. Performing Organization Report No. R&DC 04/98	
9. Performing Organization Name and Address USCG Research and Development Center 1082 Shennecossett Road Groton, CT 06340-6096				10. Work Unit No. (TRAI5)	
				11. Contract or Grant No.	
12. Sponsoring Agency Name and Address U.S. Department of Transportation United States Coast Guard Systems, (G-S) Washington, DC 20593-0001				13. Type of Report and Period Covered Final Report (DEC92-DEC98)	
				14. Sponsoring Agency Code Commandant (G-SEC) U.S. Coast Guard Headquarters Washington, DC 20593-0001	
15. Supplementary Notes The Research and Development Center technical point of contact is LCDR Michele Fitzpatrick, 860-441-2859.					
16. Abstract  Environmental regulations affect every aspect of Coast Guard operations from the way personnel commute to work, to emissions from heating plants and fuel storage tanks. Compliance with these regulations has greatly increased the cost and labor hours devoted to the storage and inventory control of hazardous materials, disposal of hazardous waste, and collection of associated data. Over the last decade, the management of hazardous materials and their associated by-products has become an increasing burden at every Coast Guard facility. Research and analysis of hazardous materials and waste programs at Coast Guard facilities, as well as reports from the Department of Defense and industry, indicate that significant reductions in the generation of hazardous wastes, air pollutant emissions, and environmental reporting costs are possible if the areas of hazardous materials management can be improved.					
17. Key Words hazardous materials management pollution prevention waste minimization			18. Distribution Statement This document is available to the U.S. public through the National Technical Information Service, Springfield, VA 22161.		
19. Security Classif. (of this report) UNCLASSIFIED		20. SECURITY CLASSIF. (of this page) UNCLASSIFIED		21. No. of Pages	
				22. Price	

# METRIC CONVERSION FACTORS

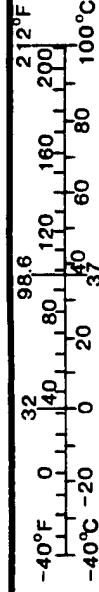
## Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply By	To Find	Symbol
<b>LENGTH</b>				
in	inches	* 2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
<b>AREA</b>				
in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.8	square meters	m <sup>2</sup>
mi <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>
	acres	0.4	hectares	ha
<b>MASS (WEIGHT)</b>				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
<b>VOLUME</b>				
tsp	teaspoons	5	milliliters	ml
tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.76	cubic meters	m <sup>3</sup>
<b>TEMPERATURE (EXACT)</b>				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

\* 1 in = 2.54 (exactly).

## Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply By	To Find	Symbol
<b>LENGTH</b>				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
<b>AREA</b>				
cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	square kilometers	0.4	square miles	mi <sup>2</sup>
ha	hectares (10,000 m <sup>2</sup> )	2.5	acres	
<b>MASS (WEIGHT)</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
<b>VOLUME</b>				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	0.125	cups	c
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>
<b>TEMPERATURE (EXACT)</b>				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



## TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
LIST OF ACRONYMS .....	vii
EXECUTIVE SUMMARY .....	ix
1.0 OVERVIEW .....	1
1.1 Introduction .....	1
1.2 Background .....	2
1.2.1 Rules and Regulations .....	2
1.2.2 Coast Guard Policy .....	3
1.2.3 Resource Considerations .....	3
1.3 Myth vs Reality .....	4
2.0 HISTORICAL REVIEW .....	6
2.1 Hazardous Waste Assessment Conference .....	6
2.2 Servicewide Hazardous Waste Assessment Project .....	6
2.3 Pollution Prevention Opportunity Assessment .....	7
2.4 Group New York .....	8
2.5 HM/HW Information Management Project .....	8
2.6 Air Station Miami .....	9
2.7 Logistical Plan for Hazardous Materials for the Aeronautical Engineering Community .....	10
2.7.1 Materials Management .....	11
2.7.2 Data Management .....	11
2.7.3 Controlled Prototyping .....	12
2.8 Simulation Analysis Of Hazardous Materials Purchasing Alternatives .....	12
2.9 Functional Economic Analysis of Selected CG Facilities .....	13
2.10 Coatings Analysis .....	14
3.0 CURRENT PROCESS .....	15
3.1 General Conditions Previous to EPCRA Manual .....	15
3.1.1 Materials Management .....	16
3.1.2 Information Management .....	17
3.1.2.1 Aviation Community .....	18
3.1.2.2 Vessel Community .....	19
3.1.2.3 Industrial Facilities .....	19
3.1.3 Hazardous Materials Minimization .....	20
3.2 EPCRA Manual .....	20
3.3 Issues & Concerns .....	21
4.0 IMPROVED PROCESS [DESIRED STATE] .....	23
4.1 General .....	23
4.2 Depots .....	23
4.3 Large Facilities .....	24
4.4 Intermediate Facilities .....	24
4.5 Small Facilities/Units .....	24

5.0 PROCESS IMPROVEMENT .....	25
5.1 General .....	25
5.2 Policy .....	25
5.3 Materials Management .....	26
5.4 Information Management .....	29
5.5 Hazardous Materials Minimization .....	30
5.6 Training .....	31
REFERENCES .....	32
APPENDIX A: Point Mugu Case Study .....	A-1
APPENDIX B: HAZMAT Center Prototype .....	B-1
APPENDIX C: Pilot WHEC Environmental Compliance Program .....	C-1

## LIST OF TABLES

1. Myth vs Reality.....	5
2. Establishing a HAZMAT Center .....	28

## LIST OF ACRONYMS

<b>A/S</b>	Air Station
<b>ACMS</b>	Aviation Computerized Maintenance System
<b>ACUL</b>	Authorized Chemical Use List
<b>AMMIS</b>	Aviation Maintenance Management Information System
<b>ARSC</b>	Aircraft Repair and Supply Center
<b>ATC</b>	Aviation Training Center
<b>CAA</b>	Clean Air Act
<b>CAD</b>	Computer Aided Design
<b>CERCLA</b>	Comprehensive Environmental Response, Compensation and Liability Act
<b>CEU</b>	Civil Engineering Unit
<b>CG</b>	United States Coast Guard
<b>CGHQ</b>	United States Coast Guard Headquarters
<b>CGY</b>	Coast Guard Yard
<b>CM+</b>	Configuration Management Plus System
<b>COMDTINST</b>	Commandant's Instruction
<b>DESCIM</b>	Defense Environmental Security Corporate Information Management
<b>DM-HMMS</b>	Depot Maintenance - Hazardous Material Management System
<b>DOD</b>	Department of Defense
<b>DOT</b>	Department of Transportation
<b>ELC</b>	Engineering Logistics Center
<b>EO</b>	Executive Order
<b>EPA</b>	Environmental Protection Agency
<b>EPCRA</b>	Emergency Planning & Community Right to Know Act
<b>FEA</b>	Functional Economic Analysis
<b>FFCA</b>	Federal Facilities Compliance Act
<b>G-S</b>	Coast Guard Headquarters Systems Directorate
<b>G-SEA</b>	Coast Guard Headquarters Aeronautical Engineering Division
<b>G-SEC</b>	Coast Guard Headquarters Civil Engineering Division
<b>GINY</b>	Governor's Island, New York
<b>GIS</b>	Geographic Information System
<b>GNY</b>	Group New York
<b>HAZCOM</b>	Hazard Communication
<b>HAZMAT</b>	Hazardous Materials
<b>HCS</b>	Hazard Communication Standard
<b>HICS</b>	Hazardous Inventory Control System
<b>HM</b>	Hazardous Materials
<b>HM/HW</b>	Hazardous Materials and Hazardous Waste
<b>HMC</b>	Hazardous Materials Coordinator

## LIST OF ACRONYMS (cont.)

<b>HMIS</b>	Hazardous Materials Information System
<b>HMM</b>	Hazardous Materials Management
<b>HMMS</b>	Hazardous Materials Management System
<b>HW</b>	Hazardous Waste
<b>ISC</b>	Integrated Support Command
<b>JLSC/DM</b>	Joint Logistics System Center Depot Maintenance Directorate
<b>MLC</b>	Maintenance and Logistic Command
<b>MSDS</b>	Material Safety Data Sheet
<b>NEPA</b>	National Environmental Policy Act
<b>NESHAPS</b>	National Emissions Standards for Hazardous Air Pollutants
<b>NSN</b>	National Stock Number
<b>NWG</b>	Natural Work Group
<b>OSHA</b>	Occupational Safety & Health Administration/Act
<b>P2</b>	Pollution Prevention
<b>PPA</b>	Pollution Prevention Act
<b>PPC</b>	Pollution Prevention Coordinator
<b>PPOA</b>	Pollution Prevention Opportunity Assessment
<b>R&amp;D</b>	Research and Development
<b>RCRA</b>	Resource Conservation and Recovery Act
<b>RDC</b>	Research and Development Center
<b>SARA</b>	Superfund Amendments and Reauthorization Act
<b>SCPO</b>	Senior Chief Petty Officer
<b>TRI</b>	Toxic Release Inventory



## EXECUTIVE SUMMARY

Environmental regulations affect every aspect of Coast Guard (CG) operations from the way personnel commute to work, to emissions from heating plants and fuel storage tanks. Compliance with these regulations has greatly increased the cost and labor hours devoted to the storage and inventory control of hazardous materials, the disposal of hazardous waste and the collection of associated data. Over the last decade, the management of hazardous materials and their associated by-products has become an increasing burden at Coast Guard facilities. Research and analysis of CG hazardous materials and waste programs, as well as reports from the Department of Defense (DOD) and industry, indicate that significant reductions in the generation of hazardous wastes, air pollutant emissions, and environmental reporting costs are possible if Hazardous Materials Management (procurement, storage, distribution, and use) is improved. It is critical that process improvement decisions be based on quantifiable measurements, not anecdotal information and/or broad assumptions.

Some of the hazardous waste disposed at CG facilities results from maintenance and repair of operational equipment (aircraft, boats, cutters, buoys, support equipment), and much of it is due to facility maintenance, particularly at the larger facilities. However, a great deal of that waste is unused hazardous materials. The lack of a formal Hazardous Materials Management (HMM) program in the CG has contributed to materials exceeding shelf life, overstocking, duplication of orders and the general lack of standardization regarding the purchase and use of hazardous materials.

There are three major areas associated with a Hazardous Materials Management program:

- (1) materials management (inventory control);
- (2) reporting (data/information management); and
- (3) hazardous materials minimization.

Each of the first two areas can be dealt with separately; however, a data management system alone is inaccurate, labor intensive, and repetitive. Inventory can be controlled through authorized use lists and regulating purchasing, but without data management there are no records. A successful HMM program ties inventory control and data management together and contains a process for minimizing HM use. A thorough review of government (including CG) and commercial HMM programs identified the following key elements for success:

- Procurement control (controlling purchasing and managing materials requirements);
- Inventory control (minimizing on-site storage and improving use and reuse of materials);
- Prototype control (standard techniques for test and approval of substitute materials);
- Usage reduction;
- Data management (standard data formats and easy access to data); and
- A process that is as transparent as possible to the technician.

There are many examples of successful hazardous materials management programs in the CG that have incorporated one or more of these elements, but unfortunately there is no single program that can be applied to all CG units. For example, materials needs and purchasing processes were very different for small boat stations vs. support centers, air stations vs. cutters. From a review of the successful (and some not so successful) CG HMM programs that have been implemented, it is clear that the "improved process" the CG has been searching for is not one improved process, but technical elements of proven processes tailored to the size and scope of each facility.

## RECOMMENDATIONS

All units need to have some level of data management (which is required for mandatory reporting but also needed to support non-reporting or non-use). Small units that don't generate much hazardous waste already have an inventory control system that works great for them. They tend to be of a size that they don't have extra funds to spend on unneeded materials, and excess materials are readily identified. These units just need guidance concerning what data they need to capture and report, and suggestions for the easiest way to manage it. Facilities that generate small quantities of hazardous waste need some modest form of inventory control. They need to look for where the materials are coming in and stop the flow of excess. If a unit has central management for other commodities, they should manage hazardous materials the same way. A small boat station where the Executive Petty Officer approves all purchases most likely already has adequate, centralized procurement control.

Large facilities have a need for data management and inventory control. Two places in the CG that warrant careful management of hazardous materials similar to the large DOD programs are the Aircraft Repair and Supply Center in Elizabeth City, NC, and the Coast Guard Yard in Curtis Bay, MD. For large facilities with multiple units, facilities that generate large quantities of hazardous waste, or facilities dealing with air pollution control regulations, an inventory tracking system is essential. For a permitted facility, inventory management is mandatory, including the need to manage procurement.

Intermediate-sized facilities should have some form of inventory control and data management; the question is how much is appropriate. Deciding what level is appropriate is a judgment call for the command with the help of the appropriate Maintenance and Logistics Command (MLC) and/or CG Headquarters.

Most successful long-term, long-running programs are those that are transparent to the technician. The technician needs to have the materials to do the job in the quantities needed, without having to do a lot of extra paperwork/data entry to get it. Any program that impacts the technician's ability to do the job is destined to fail.

A significant issue that needs to be addressed is the fact that successes are sporadic and primarily individually (vs organizationally) driven. The CG needs to make major changes in its policy and culture to ensure that hazardous materials management successes become permanent fixtures.

## 1.0 OVERVIEW

The CG Research and Development Center (RDC) has worked with CGHQ Program Managers, field staff and operational units for five years to identify, define, and find solutions to the CG's internal environmental challenges. This overview chapter introduces the HMM problem and its associated rules, regulations, policies, and myths. The rest of the report summarizes the various CG projects conducted in this area, the current status of CG hazardous materials management (HMM), recommendation for improved HMM processes (desired state), and suggestions for how to get there (process improvement). While much of this work was done previous to CG streamlining (and subsequent name changes), post-streamlining terminology is used wherever possible.

### 1.1 INTRODUCTION

Over the last decade, the management of hazardous materials (HM) and their associated by-products has become an increasing burden for Coast Guard (CG) operational units and industrial and support facilities. Compliance with environmental regulations has greatly increased the cost and labor hours devoted to the storage and inventory control of hazardous materials, the disposal of hazardous waste and the collection of associated data. The resource burden of these unfunded processes has made it necessary for the CG to reevaluate its hazardous materials program.

By definition, hazardous materials are any materials which, because of their quantity, concentration, or physical or chemical characteristics, pose a present or potential hazard to human health and safety or to the environment. Hazardous materials management is an important aspect of the CG's overall commitment to Environmental Excellence. The Commandant's policy committing the Coast Guard to Environmental Excellence reads:

*The Coast Guard is committed to an aggressive internal environmental program which fully complies with environmental laws and regulations. Just as we are a leader in environmental law enforcement, so must the Coast Guard be a leader in ensuring our own vessels and facilities, operations and personnel comply with environmental laws. Only by ensuring our own house and actions are in order will we continue to receive the full support of the American public and Congress in carrying out our mission.*

*Proactive programs and relevant actions will reduce the long term cost of remediation and potential personal liability. Such efforts include:*

- *Institutionalizing environmental compliance as a command priority at every level within the Coast Guard;*
- *Applying resources to mitigate Coast Guard generated contamination, to restore environmental quality, and to eliminate preventable contamination from pollution and waste from our vessels, aircraft and shore facilities;*
- *Employing innovative uses of technology to conserve resources;*
- *Recycling; and*
- *Procuring technologies and packaging that eliminate or minimize generation of waste.*

Preliminary research, including reports from the Department of Defense (DOD) and industry, indicates that significant reductions in the generation of hazardous wastes, air pollutant emissions, and

environmental reporting costs are possible if hazardous materials procurement and distribution are improved.

## **1.2 BACKGROUND**

### **1.2.1 Rules and Regulations**

Hazardous materials and hazardous waste (HM/HW) reporting requirements are mandated by Executive Order (EO), the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), and State and local agencies with regulatory authority over environmental and safety issues. HM/HW information is also required on an ad hoc basis to respond to inquiries from Congress, the Department of Transportation (DOT), and other government agencies. Some of the laws, regulations and Executive Orders driving improvements to hazardous materials management are described below.

29 CFR 1910.1200, OSHA's "Hazard Communication Standard." The Hazard Communication Standard (HCS) is based on a simple concept - that employees have both a need and a right to know the hazards and identities of the chemicals they are exposed to when working. They also need to know what protective measures are available to prevent adverse effects from occurring. The HCS requires information to be prepared and transmitted regarding all hazardous chemicals, including a list of all hazardous chemicals used by employees and a Material Safety Data Sheet (MSDS) for each hazardous chemical which they use. MSDSs must be readily accessible to employees when they are in their work areas during their workshifts.

Emergency Planning and Community Right-to-Know Act (EPCRA) (also known as Title III of the Superfund Amendment and Reauthorization Act (SARA)). EPCRA added the toxic chemical release inventory (TRI) reporting to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The TRI reporting requirements are met through completion and submission of EPA Form R. [Only the largest of the CG's industrial facilities handle sufficient quantities of HM to be required to submit a Form R. However, the onus is on other facilities to prove to the EPA that their "releases" fall under the TRI thresholds.]

Pollution Prevention Act (PPA) of 1990. The PPA imposes additional source reduction and pollution prevention (P2) data reporting requirements for facilities required to file annual TRI forms under SARA Title III:

- The quantity of chemicals entering any waste stream prior to recycling, treatment or disposal;
- The amount of the chemical from the facility which is recycled;
- The source reduction practices used with respect to that chemical.

Executive Order 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements." This EO requires all federal agencies to comply with the planning and reporting provisions of the Emergency Planning and Community Right-to-Know Act and the Pollution Prevention Act. CG Commandant Instruction (COMDTINST) M16455.10 (discussed in Section 3.2) implements the CG's program to comply with this EO. In addition, EO 12856 set a goal of 50 percent reduction in toxic releases and waste generation for federal facilities by 1999, requiring chemical (in addition to product) tracking.

Clean Air Act (CAA) Amendments of 1990. The purpose of the Clean Air Act is to protect the quality of the Nation's air resources. The 1990 CAA Amendments directed EPA to implement programs necessary to meet pollution reduction goals. These programs include: (1) establishment of national air quality standards for "criteria pollutants"; (2) setting national standards for emissions of "hazardous air pollutants"; and (3) requiring states to implement plans that will control emissions of criteria pollutants within the state.

Federal Facility Compliance Act (FFCA) of 1992. The FFCA waived sovereign immunity for the Resource Conservation and Recovery Act (RCRA) of 1976; noncompliance may result in fines and/or penalties. RCRA creates a framework for the proper management of hazardous and non-hazardous waste. Its goals are to: (1) protect human health and the environment; (2) reduce waste and conserve natural resources; and (3) reduce or eliminate the generation of hazardous waste as expeditiously as possible. RCRA includes regulations regarding the generation, transportation, treatment, storage and disposal of hazardous wastes, including an extensive manifest system designed to track the wastes from "cradle-to-grave."

### **1.2.2 Coast Guard Policy**

The Commandant's policy statement commits the CG to Environmental Excellence. However, there is very little guidance for units trying to implement this policy, especially in the area of Hazardous Materials Management (inventory control, information management, and minimization). Hazardous materials policy issues are handled by a variety of offices and programs. The Pollution Prevention Committee was formed in 1992 to bring together these various programs and address HM/HW issues in a consistent manner. The Committee has had many successes in these areas, but has not yet developed an implementable HMM policy.

Program and engineering system managers need current HM/HW data to fulfill the mandated reporting requirements and determine the impact of potential or newly enacted environmental laws and regulations on Coast Guard activities. Such information is also key to helping program managers and field personnel identify opportunities for hazardous waste reduction and pollution prevention, as mandated. The CG does not currently have an information system capable of satisfying HM/HW information requirements or the policy to develop one.

Information management must be coupled with strong materials management practices. If HM acquisition and inventory are not controlled, associated data will be erroneous or nonexistent. The CG needs to develop procurement policies and procurement guidance which address inventory control problems such as overstocking and excessive year end buying.

Specific policy recommendations can be found in Section 5.2.

### **1.2.3 Resource Considerations**

The effects of streamlining and budget reduction make it imperative that the CG allocate its resources wisely. Inefficient management of hazardous materials (including over management) results in wasted resources in many ways:

- Funds spent purchasing materials that are never used;
- Funds spent disposing of unused materials;

- Personnel time spent handling unneeded materials (purchasing, receiving, storing, inventory, disposal, training, and the associated paperwork);
- Increased potential for personnel injuries handling hazardous materials (resulting in lost work time and medical costs);
- Increased potential for spills and releases (resulting in fines and cleanup costs);
- Increased potential for permitting fees and non-compliance fines;
- Cost of purchasing expensive, unnecessary control systems;
- Labor associated with managing unnecessary control systems; and
- Cost of random testing of alternatives.

Obviously if less hazardous materials are purchased, less resources will be expended in the above areas. Extensive research has been performed to quantify the benefits of improved HMM programs for CG facilities. Savings identified through the implementation of HMM programs throughout DOD are approximately 20% of the total hazardous material purchases annually (this does not include savings to hazardous waste reduction and reduced liabilities).

Too much management is as costly as too little. In the past, the CG has initiated some large scale fixes, based on DOD problems, at facilities where we didn't even know if the problem warranted it.

### **1.3 MYTH VS REALITY**

In the early stages of its environmental management program, the Coast Guard often assumed that if DOD had a problem, the CG probably had it also, and that a scaled-down version of DOD's solution should work for us. After collecting actual CG facility environmental data, it was discovered that while many of the CG's problems are similar to DOD's, they are often different enough that they require different solutions.

Many of the early hazardous materials management proposals were based on myths and assumptions generated from much larger institutions. For example, the Air Station Miami study (see Section 2.6) and other HM assessments exposed many of the fallacious assumptions, and allowed for the development of CG-specific solutions. Fiscal management of unit funds was found to be responsible for many of the supply and storage problems. The concept and management of dated materials was reevaluated.

One example is the issue of Shelf Life Extension. It was determined, from the Hazardous Waste Assessment study (see Section 2.2) and reports from hazardous waste managers, that unused hazardous materials comprised a large percentage of the CG's hazardous waste stream (e.g., in 1992 ISC Seattle estimated that 20-30% of their HW was excess HM). A major assumption was that, like DOD, much of the unused HM became waste because its shelf life expired. One logical solution would be to improve shelf life extension procedures. This solution was encouraged by both a consultant and CG employees, many of whom had been previously connected to DOD and were aware of their issues, problems, and solutions. However, there would be limited return on such an effort for the CG, since it was found during various site visits that CG personnel using HM generally did not concern themselves with the expiration dates stamped on the can. Unused HM became excess/waste for reasons other than shelf life (condition of can (rusty, leaky), new shop chief/supervisor/personnel prefers a different brand, various procurement issues, et al).

Table 1 shows some of the more common myths and their associated realities.

**TABLE 1. MYTH VS REALITY**

<b><u>MYTH</u></b>	<b><u>REALITY</u></b>
1. CG problems resemble DOD's, therefore a scaled-down version of DOD's solutions should solve our problems.	1. While many of our problems are similar, they often require different solutions.
2. Many sales representatives offer "drop-in replacements" for common hazardous materials such as solvents, degreasers, and paint removers.	2. There are no direct substitutes. The alternative material must be matched to the process where it's being applied.
3. Hazardous materials are unusable and disposed as waste when they've exceeded their shelf life.	3. Many hazardous materials are usable past the date stamped on the can, or can be used as a lesser standard or alternative product.
4. Most of our excess materials that become waste are due to maintenance/repair of operational equipment.	4. Facility/building maintenance produces most of our excess materials/waste, especially at large facilities.
5. We should find/develop one HMM system/process to apply to all CG units.	5. There is no HMM one-size-fits-all. We need to tailor elements of successful processes/procedures to the size and scope of each facility.

Tradition has played an important part in the purchase of HM, especially in the over-purchase of bulk paints, aerosol paints, and cleaning materials. Units tend to keep large inventories of paints to satisfy the personal desire of whoever is in charge of painting. Unit personnel stated they had large inventories of paint due to the purchase of different brand paints by former personnel.

## **2.0 HISTORICAL REVIEW**

Although not all-inclusive, this Chapter summarizes the work that was done in CG Hazardous Materials Management (primarily by the Research and Development Center and various CGHQ offices, mainly the Aeronautical Engineering Division (Commandant (G-SEA))) in the past five years (December 1992 to December 1997). The studies are generally presented in the order in which they occurred (although there is a significant amount of overlap), giving the reader a sense of our understanding of CG HMM as it unfolded.

### **2.1 HAZARDOUS WASTE ASSESSMENT CONFERENCE**

A workshop of over sixty (60) CG officials (military and civilian) with major responsibilities in environmental management, pollution prevention, and environmental compliance was held in Mystic, CT in December 1992 to provide HQ and the field with an interchange of information, identify near and long term issues affecting field operations, provide input to the Pollution Prevention Committee, and identify areas requiring R&D support. The workshop assisted HQ in a better definition of field activity hazardous waste concerns and suggested "targets of opportunity" for near term improvements and long-term initiatives (A. F. Meyer, 1992).

The workshop brought together representatives of CGHQ and other staffs, the R&D Center, and field organizations. Representatives of the Environmental Protection Agency (EPA), the Department of Defense (DOD), and US Navy also participated. The purpose of the workshop was to provide a mechanism for transferring information on ongoing, relevant programs in other agencies regarding current problems and needs of field organizations. It also served to assist CGHQ and the R&D Center in focusing on improvements needed for the rapidly changing CG programs for pollution prevention (P2) and hazardous waste (HW) minimization.

Work Group participants recognized that, among other factors, a great deal of the disposed hazardous waste starts as unused hazardous material that should not have been purchased in the first place (primarily due to improper ordering and overstocking).

For many participants, this workshop provided an introduction to Navy CDR Ed Payne and his HMM program for Point Mugu, CA Naval Air Station. CDR Payne's program became the prototype for much of the federal government's (including the CG's) hazardous materials management efforts. His four-tiered approach includes issue and control, on-site reuse and recycling, off-station recycling, and waste disposal. In addition, he developed a computer program, Hazardous Inventory Control System (HICS), to track his facility's hazardous materials from "cradle-to-grave." The details of CDR Payne's prototype program are described in Appendix A (Payne, 1992).

Much of the work that is discussed in the rest of this Chapter resulted from discussions held and connections made at this workshop. The HICS program was eventually adapted for Hazardous Materials Management at many CG facilities (see Sections 2.7 and 5.4).

### **2.2 SERVICEWIDE HAZARDOUS WASTE ASSESSMENT PROJECT**

One of the conclusions from the Hazardous Waste Assessment Conference was that the CG needed a better understanding of the HW generated by its units. Generators of HW are required by the Resource Conservation and Recovery Act to maintain manifests of their wastes, but this information is kept at the



unit level. There was no easy way for the Environmental Management personnel in CGHQ to know the amount and types of waste being generated in the field, nor the cost of its disposal.

To remedy this lack of information, the RDC conducted a Servicewide Hazardous Waste Assessment (FY93-FY94) to identify and analyze the use of hazardous materials Coast Guard-wide, and develop a servicewide hazardous waste baseline for identifying targets of opportunity for minimization and measuring future reductions of hazardous waste generation.

A Coast Guard Servicewide Hazardous Waste Profile Update, based on a Maintenance and Logistics Command/Civil Engineering Unit level records search, was completed by A. F. Meyer and Associates, Inc. in FY93. The results of the Profile Update pointed to the need for more detailed information. Commandant Notice 16478, signed by the Chief of Staff, was sent in July 1993 with a survey form to all units generating hazardous waste. It took almost a year to get a 95% response to this survey. The data were entered into a Paradox database by Volpe National Transportation System Center personnel.

An analysis of the survey data revealed that the primary CG hazardous wastes (in 1993) were paint and paint-related materials, used petroleum/hydrocarbon products (oils, greases, cleaners, solvents, and fuels), spent batteries, and unused hazardous materials. Less than 5% of the wastes had information about the processes that generated those wastes, making it difficult to draw any conclusions about hazardous materials use from the survey.

However, the Profile Update and survey produced several recommendations related to hazardous materials management:

- Establish an authorized use list for shore facilities and cutters;
- Implement a hazardous materials substitution program;
- Include HW and HM data within the CG office automation system; and
- Adopt a version of the Navy's hazardous material minimization and reutilization program at large CG facilities.

### **2.3 POLLUTION PREVENTION OPPORTUNITY ASSESSMENT**

A Pollution Prevention Opportunity Assessment (PPOA) was conducted at the Aviation Training Center (ATC), Mobile, AL, in November 1993. This assessment was one of the EPA's Waste Reduction Evaluations at Federal Sites Program and followed the procedures in EPA's Facility Pollution Prevention Guide. This was the first PPOA conducted by the EPA at a corporate-size facility in the aerospace industry (TRC, 1994). An implementation plan was prepared by RDC and the CGHQ Office of Aeronautical Engineering (Commandant (G-SEA)) in order to make the results of the assessment more usable by ATC Mobile and other CG units (Fitzpatrick, 1994).

The assessment team identified several ongoing practices that contributed to effective hazardous materials management. These included the CG Aeronautical Engineering program allowing routine maintenance to be scheduled and tracked for each individual aircraft by the Aviation Computerized Maintenance System (ACMS), and the development of authorized chemical use lists (ACUL) for each airframe.

One of the waste streams identified for aircraft maintenance was unused materials that were too old (vice expired shelf life), contaminated, or no longer needed.

PPOA recommendations to improve HMM included investigating the feasibility of a centralized hazardous materials management system for the airframe shops to reduce inventory, shelf-life losses, and duplicate products.

## **2.4 GROUP NEW YORK**

By summer 1994 it was obvious from CG hazardous waste assessments that unused hazardous materials were a large contributor to the hazardous waste stream. Hazardous materials inventory control and management would need to be a part of all facility pollution prevention plans, including the CG's Model Pollution Prevention facility (planned for Support Center New York). Therefore an important HW minimization and Pollution Prevention R&D objective was to determine the most efficient and cost-effective methods for HM management at CG facilities.

In order to meet this objective, the R&D Center tasked two Reservists on temporary active duty in the summer of 1994 with conducting a hazardous materials management study on Governor's Island, NY (GINY). After interviewing several GINY commands, they determined that a more detailed study using Group New York (GNY) would provide the most useful information for the project. A Hazardous Materials Management Program developed for GNY could serve as a model for other Groups, and could also be used as an example for an Island-wide program.

This study identified issues that needed to be addressed as part of a unit's HMM program. Purchase of hazardous materials was found to be a special problem. At the Group, HM could be procured through the SERVMART (CG-owned supply center), the National Stock System, direct purchase via credit card, or direct purchase via procurement request (small purchase). It was difficult to track the purchase of HM with such a variety of systems, particularly purchases using credit cards. Units sampled used all purchase formats, with the exception of outlying units that did not have access to SERVMART. Another important issue was the tendency to stock large inventories of paint, much of it leftover by previous personnel in charge of painting, or purchased with end-of-year funds.

The study recommended that the CG apply controls in the procurement and management of hazardous materials, including reduction in their use. The report noted that COMDTINST M16455.10, Emergency Planning and Community Right-to-Know Act and Pollution Prevention, required the development and use of a Hazardous Materials Management System, and included suggestions for implementing this instruction at the Group level.

## **2.5 HM/HW INFORMATION MANAGEMENT PROJECT**

The Hazardous Materials and Hazardous Waste (HM/HW) Information Management Project was a two-phase project designed to determine the information needed by the CG's environmental program in order to minimize the amount of hazardous materials used and hazardous waste generated, and recommend an information management system to meet the CG's needs. A streamlined business process reengineering approach was used to determine HM/HW information needs and the processes required to acquire the data. An analysis was made of both the Coast Guard's data requirements and databases/systems currently implemented for HM/HW in the CG and other organizations.

Phase I of the Hazardous Materials/Hazardous Waste Information Management project was completed in November 1994. A Project Team consisting of CG environmental specialists, representing a broad spectrum of organizations and levels, participated in a series of interactive workshops and interviews to develop a description of current HM/HW information management roles, responsibilities, life cycle

activities, and information requirements. The Project Team also identified issues and problems, and made recommendations for improving HM/HW information management (OGDEN, 1994a and 1994b).

The purpose of Phase II of the HM/HW Information Management project, completed in July 1996, was: to complete an AS-IS model of current CG HM/HW processes; identify process improvements, with an emphasis on information flows (illustrated with a TO-BE model); and develop a plan for implementing these improved processes. In Phase II we brought together a CG Project Team similar to Phase I. We used facilitated workshops to identify current and improved processes for hazardous materials procurement and its associated information.

To develop a generic picture of the current environment as a baseline for the study, the Project Team used a structured technique called Integration DEFinition (IDEF) to trace the flow of materials, and data about those materials, through the HM/HW pipeline. (IDEF is a standard means of representing process flow, its components, and their relationships.)

The AS-IS model created by this group provides a generic description of how the Coast Guard handles HM/HW processing from the viewpoint of the facility Hazardous Materials Coordinator/Pollution Prevention Coordinator (HMC/PPC). It also provides a graphical description of the flow of information and materials. Previous work found large variations among facilities in their processing of HM/HW and associated information. The AS-IS model attempted to level out these variations and serve as a baseline for measuring and implementing changes and improvements, focusing on the overall picture. This baseline provided a common starting point for the recommendations in the implementation plan.

To develop the TO-BE model, members of the Project Team met in a facilitated workshop and reviewed the issues, opportunities, and best/alternative business practices for CG HM/HW information management. This group, which had participants from field units and headquarters, built a series of IDEF diagrams to illustrate their vision for acquiring consistent, integrated HM/HW data and making it available at all levels of the Coast Guard.

The core of the TO-BE working group's recommendation is a strong CGHQ working level coordination among the fleet, aviation and facilities engineering communities; the storekeepers; logistics planners; and any other stakeholders in HM/HW management.

The Phase II report included a list of the basic data required to meet the reporting requirements of OSHA HAZCOM, EPA HW disposal regulations, and the EPCRA/P2 manual (see Section 1.2.1).

## **2.6 AIR STATION MIAMI**

The objective of this project (conducted by Commandant (G-SEA) with RDC support) was to identify how the cost of hazardous waste management could be reduced by the utilization of modern logistical techniques with regards to the purchase, storage, handling, and disposal of hazardous materials.

This study proved to be one of the most important hazardous materials studies performed at a Coast Guard facility. The study included a complete audit of annual hazardous materials purchases, storage, use and waste generation. It validated the results of the Servicewide Hazardous Waste Assessment Project performed by the R&D Center.

The results of the A/S Miami study were far reaching. Many of the CG's early hazardous materials management proposals were based on myths and assumptions (see Section 1.3) generated from much

larger institutions. This study created doubt about many of these basic assumptions, especially concerning the sources of excess materials, management of shelf life, and the way materials are brought on to the facility. The concept and management of dated materials was reevaluated.

Surprisingly, the study identified that many of the excess materials were generated not through the primary industrial (aircraft maintenance) process but rather from facility maintenance (similar results were found at other CG industrial facilities). The lack of facilities management led to unmanaged usage of resources and unstructured facilities repairs. The primary cause of this problem was the facility not following the existing guidelines for facilities maintenance (i.e. architectural coatings) contained in the CG Coatings and Color Manual.

The fiscal management of unit funds was responsible for many of the supply and storage problems. Due to its flat management structure, the Air Station ended up with essentially nine separate supply functions (one for each shop). The two major concerns from this type of fiscal management come from parallel purchasing and minimum quantity orders. One shop may need a product and order that product using the minimum quantity order. While at the same time a second shop may have an identical need, place an identical order requiring the same product with the same minimum quantity order. In this example, when the need existed for two containers of a given product, two cases were required to be purchased. In addition, it was discovered that some commercial "wholesale" vendors had three accounts with the Air Station with three different discount rates, e.g. vehicle maintenance paid different prices than supply for identical items. An inventory confirmed the discovery made during the procurement review that the current fiscal management did, in fact, lead to shops purchasing and stocking excess materials, usually in case lot volumes.

The recommendations from this study were simple in concept but difficult to implement, because they required changing how the facility conducted business. One recommendation was for the facility to establish a consolidated purchasing office and a central warehouse for the management and distribution of HM. The need at a small facility was to allow a shop to draw the product that they ordered in the quantity needed rather than in minimum quantities as supplied by the Federal Stock System. Other recommendations included review of architectural coating requirements and elimination of half of the flammable lockers (less local storage space available will result in less stockpiling).

## **2.7 LOGISTICAL PLAN FOR HAZARDOUS MATERIALS FOR THE AERONAUTICAL ENGINEERING COMMUNITY**

From the results of the Air Station Miami project, two other similar projects and the experiences gained in developing the Authorized Chemical Use Lists, SCPO Ric Peri of Commandant (G-SEA) developed the Logistical Plan for Hazardous Materials for the Aeronautical Engineering Community (Peri, 1995). It was the first holistic logistical plan for hazardous materials in the Coast Guard. To improve management of the hazardous materials inventory, eliminate the disposal of unused materials and reduce the amount of time collecting data after-the-fact, the Plan initiated a program for the management of hazardous materials that are used in repair and maintenance of aircraft throughout the CG. The program was designed to centrally manage HM at the beginning of the maintenance process with expected savings in both labor and reduced disposal cost.

The Aeronautical Engineering Plan covered the three major areas necessary for an efficient Hazardous Materials Management program. It standardized (1) hazardous materials requirements and (2) data management at air stations, and included (3) controlled prototyping of alternative products. The standardized testing of alternative chemical products and the institutionalization of the results has

eliminated duplicate testing. In addition, the program was developed to expedite the substitution of any successful alternative product.

### **2.7.1 Materials Management**

The hazardous materials that are needed at an air station are related directly to aircraft maintenance tasks. Materials management regulates these HMs to eliminate redundancy and assure continued airworthiness. Two of the tools developed by the Aeronautical Engineering Division to manage the products used in aircraft maintenance include aircraft specific Authorized Chemical Use Lists and inventory management.

Authorized Chemical Use Lists (ACUL) were developed for each of the CG's four major aircraft types. Each ACUL was developed by review of the Aviation Computerized Maintenance System requirements for chemical use. This review became the building block for development of a database of chemicals cross-referenced to maintenance task and Maintenance Procedure Card. A Natural Working Group (NWG) for each aircraft type reviewed the chemical requirements and developed the ACUL for their system. During the development of each ACUL, chemical reductions were accomplished by elimination of duplicate requirements for brand specific materials and elimination of chemicals used for outdated tasks. The ACUL is a pro-active tool that is used to select less toxic hazardous materials used in aircraft maintenance. The use of materials that are less toxic results in a reduction in the generation of toxic waste which increases the opportunity for recycling, reuse and disposal. The list of chemicals required for the maintenance of each aircraft system was reduced by an average of 27%.

Eight major logistical management programs currently used within the DOD for hazardous materials were reviewed for their ability to be adapted to CG air stations. There are two basic functions consistent in each of the programs: an inventory management element where HM are physically managed from purchase through use (addressed in this Section); and a data processing element where issue and use data are collected and reports generated (addressed in Section 2.7.2).

The inventory management function uses basic logistical procedures to better manage the HM used by the different shops located on a facility. This physical process change involves procurement control, centralized inventory and distribution in "units of use". It is these basic elements of the inventory management function that are responsible for the majority of the actual fiscal savings available in the Plan.

The Commandant (G-SEA) program consolidates the hazardous materials needs of an air station's engineering department to a single management center. This HAZMAT center is responsible for procurement, inventory management and the issuance of materials. Procurement control consolidates ordering between shops, orders materials in the most efficient quantity, standardizes materials between different applications, and limits purchases to only those listed on the ACUL. The centralized inventory removes the shops' requirements to maintain HM inventories, greatly reduces their housekeeping burden, eliminates overstocking, and provides better management of shelf-life items. Centralized distribution of HM works in conjunction with the centralized inventory system to stock and distribute materials in the most efficient size containers for the assigned tasks.

### **2.7.2 Data Management**

The second function that is accomplished by the DOD programs and adapted to the CG is some form of data management regarding the issue and use of materials. The sophistication of the DOD programs varied between applications, with each military service offering two or three different programs from

which to select. All of the programs provided similar information with regard to the inventory management of hazardous materials. Most DOD facilities require programs that capture the inventory management data and provide a variety of reports for the environmental regulatory agencies and offices within DOD. The primary disadvantage of these programs is that they were designed for very large facilities. Only one of the programs was developed for a facility approximating the size of a CG air station.

To manage the data element of the HMM system at CG air stations, the Navy's Hazardous Materials Inventory Control System (HICS) was selected as the most viable option (except for the Aircraft Repair and Supply Center in Elizabeth City, see Section 2.9). The selection process accounted for the primary need to manage the HM inventory rather than support extensive environmental reporting. An equally important factor in the selection process was the relatively low cost of the computer hardware (now provided to units as the CG standard workstation) and the fact that the software and software support was provided at no cost by the Navy. In addition, HICS was the only system reviewed that can be operated from a standard personal computer.

### **2.7.3 Controlled Prototyping**

Control of alternative prototyping is another tool developed by the Aeronautical Engineering Division to manage the products used in aircraft maintenance. Traditionally CG personnel have been active in product substitution of HMs while looking for less hazardous alternatives. While individual units were quite successful, there was no process to institutionalize this knowledge. In addition, there was no mechanism to assure that the alternative chemicals did not adversely affect the continued airworthiness of the aircraft. To remedy these issues, prototyping of chemicals for aircraft maintenance applications is now managed by Aeronautical Engineering's Industrial Systems Manager (ISM) (now located at the Aircraft Repair and Supply Center (ARSC)). The process has been formalized so that specific applications can be addressed and the results documented. By establishing centralized management of prototyping efforts, alternative chemicals or processes are tested and evaluated once, with the results being available for all air stations to review.

Once an alternative chemical has been identified, the request to prototype the product is sent to the Prime Unit which in turn forwards it to the ISM. The ISM researches the health and safety concerns, application and the environmental impact of the product's use. Once confirmed as a desirable option, the Prime Unit or another designated field unit prototypes the material in its intended application. After the prototyping is completed, the final report is forwarded the Prime Unit and ISM for review. If the chemical is found to be an advantageous alternative, it is added to the ACUL for one or more aircraft types.

## **2.8 SIMULATION ANALYSIS OF HAZARDOUS MATERIALS PURCHASING ALTERNATIVES**

The objective of this project was to determine the most cost-effective and efficient methods for hazardous materials management at CG facilities. Studies were conducted at various CG units to determine whether centralization is cost- and resource-effective by simulating and analyzing the hazardous material purchasing process.

The AS-IS and TO-BE purchasing models developed during the HM/HW Information Management Project (see Section 2.5) were used to develop simulation models using ARENA simulation software. The plan was to gather three sets of real data for each of the models, for small, medium and large

facilities. The models would then be used to determine at what point there was a resource savings for implementing centralized hazardous materials management. Unfortunately we were unable to find units that matched the models well enough to make the data useful, and recommendations for centralization are based on numerous observations and studies rather than the simulation model.

One significant problem was that the AS-IS model assumed that units were sending all HM requests through the HMC as required by the Small Purchase and EPCRA Manuals, which is one of the time problems that centralization would theoretically help to relieve. However, most of the units we visited were purchasing materials without HMC signature, primarily using credit cards, which is generally a faster process than any alternative we could suggest. In general, shop personnel were finding the fastest way available to purchase materials, and it rarely matched the AS-IS model closely enough to make any data collected valid for the model. In addition, those units that already had implemented some form of centralization rarely followed the TO-BE format, making it equally difficult to validate that model.

## **2.9 FUNCTIONAL ECONOMIC ANALYSIS OF SELECTED CG FACILITIES**

At the CG's request, DOD's Joint Logistics Systems Center's Depot Maintenance Directorate (JLSC/DM) conducted a Functional Economic Analysis (FEA) for HMM at several CG facilities (Aircraft Repair and Supply Center, Coast Guard Yard, and ISC Portsmouth). The purpose of the FEA was to determine whether or not the software tools developed for DOD depot maintenance HMM would provide a significant payback to support their use at the CG facilities.

A Functional Economic Analysis Model is used to determine the net recoveries of an information technology investment in the business process. It does this by comparing the cost of operations before and after an investment is made. In this particular case it was used to compare the cost of investing in information technology (DM-HMMS, or Depot Maintenance-Hazardous Material Management System) in order to save dollars by purchasing hazardous material through improved inventory management and control procedures. DM-HMMS is a management information system, which serves as a comprehensive hazardous materials tracking system, an environmental and occupational health management tool, and an EPA and OSHA compliance and information vehicle. It is used to gain greater control and visibility of the use of hazardous materials, reduce operating costs, and to provide the work force with a safe and healthy work environment. DOD has determined that the cut-off for cost-effectiveness of the DM-HMMS system is about \$500,000 annual purchases of hazardous materials. Most of the research supports an annual payback of about 20% of annual purchases, and DOD requires a payback period of no more than six years. Only two CG facilities fit the \$500,000 profile - the Aircraft Repair and Supply Center (ARSC) and the Coast Guard Yard.

At ARSC, the FEA estimated the annual usage of HM at about \$500,000 and identified the economic benefit of a formal HMM program through lowered material demand to exceed \$100,000 annually (this was right at the deciding line). (The FEA does not consider potential reduction of hazardous waste disposal costs resulting from reduced procurement of hazardous material, cost avoidance of fines for not properly managing hazardous material, or potential reduced occupational health claims.) The DM-HMMS system recommended for ARSC would reside on a UNIX-based business server and would facilitate the recording of hazardous materials transactions. DM-HMMS could print tracking labels for the materials and store and produce Material Safety Data Sheets. The system could provide controls to manage the authorizations as well as the ordering of hazardous materials.

The findings for the FEA conducted at the CG Yard in Curtis Bay, MD showed that the Yard already had good control over the materials due to the processes put in place for their ISO 9000 certification, and they

weren't likely to recoup any more cost savings due to reductions in hazardous materials purchases. The FEA uses a baseline of at least 12 months of purchases. During the year prior to the FEA, the Yard was developing processes that would eliminate duplicate purchasing. Since the quantitative benefits generally come from savings due to reduced purchasing, the analysis did not recommend the purchase of an expensive computer system for information management. Improved information management generally produces qualitative and personnel savings, issues not addressed in the FEA.

A walk-through FEA of ISC Portsmouth showed that a DM-HMMS system would be more extensive (and expensive) than needed for a facility of its size and annual HM purchases of less than \$50,000 (10% of required DOD cut-off).

## **2.10 COATINGS ANALYSIS**

Coating and coating removal operations have been identified as some of the largest users of hazardous materials and generators of hazardous wastes in the CG, as well as other agencies and commercial industry. The CGHQ Pollution Prevention Committee and the R&D Center recognized that the CG needed a structured process to analyze existing and emerging technologies and products for the coating and coating removal processes, taking into account environmental, safety, economic, and performance factors.

The Committee chartered a Working Group, led by the R&D Center, to develop a standard method to analyze and quantify the emissions and waste streams associated with coating processes, and to measure the effectiveness of pollution prevention alternatives. This method currently consists of a database for capturing information associated with the coating and coating removal processes, including the factors listed above. The database was designed for buoys, vessels and aircraft data. In addition, the Working Group designed a decision model to use the database information to help engineering program managers evaluate new coating process technologies.

The development of this structured method provides the CG with a tool to quantify current coating processes in a baseline, analyze alternatives to reduce waste and emissions from these processes, and to measure the effectiveness of pollution prevention efforts in this area. This effort is expected to benefit the management of CG industrial and maintenance processes by providing a tool to measure the cost-effectiveness of various alternative coating and removal processes, and specifically addresses the HM minimization and controlled prototyping aspect of hazardous materials management (see Section 5.5).



### **3.0 CURRENT PROCESS**

#### **3.1 GENERAL CONDITIONS PREVIOUS TO EPCRA MANUAL**

It is impossible to give a description of hazardous materials management that covers every unit in the CG because of their individual and varied nature. However, the analysis of many workshops, meetings and site visits gives us a general understanding of current practices. The author acknowledges that personnel at many units have developed systems to manage hazardous materials and their associated information better, and this report acknowledges those systems wherever possible. Some of these processes were used as best practice models for future implementation.

This report covers five years of work, during which time the "current practice" in the field evolved considerably. The picture presented here is a hybrid that tends toward the "worst case" end of the HMM spectrum, but most units should recognize at least some of their practices in this description.

COMDTINST M16455.10, Emergency Planning and Community Right-to-Know Act and Pollution Prevention, signed in June 1994, established hazardous materials management and procurement control for CG units Group and larger (see Section 3.2 for more information). As units began to implement this instruction, "current practice" changed dramatically and started to move toward a semblance of standardization across the CG. The rest of this Section discusses conditions prior to complete implementation of the EPCRA Instruction.

The Hazardous Waste Assessment Conference (see Section 2.1) and follow-on studies and site visits identified many problems associated with hazardous materials management. These general issues included:

- A major hazardous waste stream was unused material (due to over ordering as well as degradation of material through improper storage).
- HM were inadequately tracked - supply kept track of all purchases (but not HM separately), facilities engineering tracked wastes; there was generally no control in between (users not tracking use).
- HM/HW management was disjointed.
- HM/HW information was not sufficiently organized or readily accessible.
- HM procurement was inadequately controlled.
- HM inventories were inadequately controlled.
- Too much material was being purchased without asking for MSDSs.
- Materials were being purchased just to do the job with no thought of disposal problems that may occur.
- Major commands would have two or three divisions ordering the same material for similar projects.
- Limited consumption data were available for individual shops/processes.
- The evaluation process for substitute products was primarily conducted ad hoc in the field, without a standard measurement or recordkeeping process.

These problems needed to be corrected for many reasons, including:

- Stockpiles represent either sunk costs or unrealized potential sales to most operations.
- On-site storage is a potential source of releases, exposures and liabilities.
- Knowledge of on-site materials is essential to meet unanticipated requirements.

- Management of materials required for maintenance assures that delayed repairs will not be the source of releases or spills.

Despite (or perhaps because of) these wide-spread problems, there were a lot of successful efforts at the field (and sometimes program) level to get HMM under control, even prior to EPCRA. These successes were primarily due to dedicated individuals, often working extra hours and with minimal guidance. The downside of these individual efforts is that there's little consistency between solutions, there are few measurable results, and the solutions may result in overregulation and/or be inefficient or incorrect.

As discussed in Section 2.7, Hazardous Materials Management includes three separate but interdependent issues - inventory control (materials management), information management, and minimization. Each of these issues will be explained separately.

### **3.1.1 Materials Management**

As mentioned earlier, the lack of a formal Hazardous Materials Management (HMM) program in the CG has contributed to materials exceeding shelf life, overstocking, duplication of orders and the general lack of standardization regarding the purchase and use of hazardous materials within the same facility. Many work areas/shops maintain independent stockpiles for the chemicals and materials involved in their operational and/or maintenance tasks. The need for such stockpiling is rarely questioned, because:

- Stockpiling was an accepted practice and little (if any) oversight was given to storage areas to recognize the volume of materials they contain.
- Most people know that materials purchased through the Federal Stock System are often sold in case lots rather than unit of use, so extra containers of common items are accepted as part of doing business.
- Time and effort required to obtain materials is considered wasted, so purchases are used as a chance to "stock up on a few essentials".
- The need to "spend money" at the end of the fiscal year leads to "accepted" overpurchasing of common materials such as paint and cleaners.
- There is generally no method of returning partial or unused containers of materials for others' use.

Such local area stockpiles can represent amazingly large volumes of materials that result in unrecognized sunk costs and potential liabilities to the facility.

While not unique to Air Station Miami, some of the details from the study conducted there illustrate the hazardous materials inventory issues with which the CG was dealing. As discussed in Section 2.6, a complete review of A/S Miami's FY93 procurement records was conducted. The review included every HM and HM-related equipment purchase made during the fiscal year. Since each shop was responsible for purchasing its own materials, the Air Station ended up with essentially nine separate supply functions (one for each shop). The two major concerns from this type of fiscal management come from parallel purchasing and minimum quantity orders. A physical inventory confirmed the discovery made during the records review that the current fiscal management did, in fact, lead to shops purchasing and stocking excess materials, usually in case lot volumes.

A/S Miami was the first complete CG study conducted including full inventory and records search, but similar conditions were found at many other facilities. The Miami results were supported by inspections

and projects at many other units, including Air Stations Detroit, San Diego and Astoria, and Integrated Support Commands Portsmouth and New Orleans.

A great deal of the hazardous waste disposed at CG facilities starts as hazardous material that should not have been purchased in the first place. Some of this waste results from maintenance and repair of operational equipment (aircraft, boats, cutters, buoys, support equipment), and much of it is due to facility maintenance, particularly at the larger facilities. Part of the reason for this is lack of clear direction and standardization in the management of facilities/buildings, and limited headquarters ownership of the building maintenance process.

Efficient and effective hazardous materials management includes controlling purchasing, managing materials requirements, minimizing on-site storage, and improving use and reuse of materials - approaches that represent the spirit and intent of pollution prevention.

### **3.1.2 Information Management**

The primary control and data collection point for HM type and quantity information is the Hazardous Materials Coordinator (HMC)/Pollution Prevention Coordinator (PPC) acquisition approval process. This process (required by the Small Purchase Handbook and COMDTINST M16455.10) is paper-intensive and not always implemented effectively. The instructions require the purchasing authority to route all purchase orders for HM to the HMC/PPC for approval. The process fails if the purchasing agent does not recognize that an item is HM or if the purchase is made from an outside source using a credit card. Approval can also be circumvented when acquiring surplus consumables from other government users or accepting samples from vendors. On a large facility, different tenants will have different processes for materials procurement. None of the units studied had fail-safe procedures to ensure HMC/PPC approval.

The acquisition and maintenance of HM inventory data is usually a shop-level responsibility, and any standardization is usually within a command. Facilities that have large numbers of tenants reporting to different commands usually lack coordination in HM acquisition. Information that would enable tenants to economically acquire and share bulk purchases may or may not be available - depending on programs put in place by the local commander and implemented by the HMC/PPC.

The effective flow of information is critical to manage HM/HW and comply with environmental regulations. Procurement, inventory, and disposal are the main control points for collecting most HM/HW information. However, procurement and inventory procedures can and do vary widely. Information to meet most of the current requirements is available, but is not well organized. It is not maintained in a standard format. Personnel who need this information for analysis or reporting often have difficulty accessing and using it. For example, information about HM and HW quantities is generally unknown. Time spent resolving problems caused by inconsistent or missing data impacts the resources available for primary CG missions.

The primary thrust of most environmental regulations is the requirement to report the usage of hazardous materials (including emissions and waste generation). While these regulations do not significantly affect how we do business, they do require extensive amounts of data about the hazardous materials used in, and the associated waste generated from CG operations, maintenance and repair. At present, most of these data are collected after-the-fact; that is, at the end of the year or to comply with an external request regarding past usage or disposal. In all instances, the data collection requirements are unfunded and must be performed by personnel whose primary tasking is maintenance, supply, safety, etc.

The burden of data gathering falls upon individual field units. The field units do their best to satisfy all external reporting requirements, but independent efforts often result in marginal success at great expense of unprogrammed resources, detracting from mission performance. There was a lot of uncertainty in the field (and in many staff elements) as to what information was important to collect, who needs it and in what form. Many units developed computer tools to help them manage the information associated with hazardous materials. We found many self-written programs in a variety of databases, some use of off-the-shelf and DOD software, and some software specifically designed for CG facilities.

The HM/HW Information Management Project (see Section 2.5) evaluated the current HM/HW information management processes for the three major CG communities - aviation, vessel, and industrial facilities - and reported the following conclusions.

#### *3.1.2.1 Aviation Community*

The aviation community, which is managed by the Office of Aeronautical Engineering (Commandant (G-SEA)), has aggressively sought to manage the collection of HM/HW data by controlling the entrance of hazardous substances into the HM/HW pipeline through the development of lists of HM authorized for use and by setting uniform procedures for tracking these substances through use and disposition. The central repository for HM data will be the [planned] Aviation Maintenance Management Information System (AMMIS). AMMIS will be a centralized system that will support the functions of maintenance, supply, financial management, procurement, and post-award contract management, that will reside on a host minicomputer at the Aviation Repair & Supply Center (ARSC) and the 26 air stations supporting the CG's more than 200 aircraft. Each air station will maintain an inventory of all consumable materials received and issued on the central database on the minicomputer, which will provide a master repository.

AMMIS will be designed to interface with the Aviation Computerized Maintenance System (ACMS) to ensure that all materials ordered are on an authorized use list developed for each particular aircraft maintained at that location. If the HM is not on the list, or if the unit does not service the aircraft for which that HM is specified, AMMIS will reject the HM order with a warning to the user. By integration of HM management and standardized logistical management, a strong inspection system will not be required to ensure that HM controls are not circumvented.

In addition to the program-level work being pursued by Commandant (G-SEA), a facility-level computer program was developed by Civil Engineering Unit (CEU) Cleveland to assist the Aircraft Repair and Supply Center with Clean Air Act Amendment reporting (Database Graphics, 1993). AIRTOX is a Geographic Information System (GIS) implementation for inventory, monitoring, and modeling of air emissions at ARSC. Computer Aided Design (CAD) graphics from the CEU provide a detailed base map. The AIRTOX system provides capability to create and geographically reference a model of base-wide production functions onto the base map - the inventory function. The model can then be used to monitor and analyze emissions associated with processes on base. The purpose of using the GIS is to be able to visualize the process (tasks on base) and emission environment in a simple, understandable fashion, and to increase productivity by allowing the generation of emission reports and permit documentation in a much reduced time frame. Changes in material usage and control technology can be tested before actual implementation, and effects on emissions can be reported immediately - the modeling function. AIRTOX requires manual entry and update, which may be considered a disadvantage when compared to other systems. Also, it was designed primarily to manage the air quality program (especially for air emissions reporting), not HMM.

### 3.1.2.2 *Vessel Community*

The vessel community, under the guidance of the Office of Naval Engineering (Commandant (G-SEN)) and the Logistics Systems Division (Commandant (G-SLS)), is implementing a standardized HM reporting system as part of the eventual migration to the Fleet Logistics System. A feeder system called Configuration Management Plus (CM+) is currently being field tested. Current plans call for its deployment on most 110-foot and larger cutters, as well as all new cutter acquisitions and at shore stations supporting standard boats.

The purpose of the CM+ HM module is to enable a cutter's hazardous materials control officer (HMCO) to account for the item name, hazard classifications, location, and quantity of all HM on board and to enable G-SEN to account for the HM on all cutters. Currently the collection of this information is a manual process. Commandant (G-SEN) plans to require an automated HM report from each cutter with CM+ installed. This will enable them to provide required information to EPA in accordance with Commandant instructions.

CM+ has a requisition module that can also control the ordering of HM. Whenever personnel submit a requisition through the system, CM+ can check an internal authorized materials table. This table contains the National Stock Number of each authorized substance, its name, hazard classification code, and the quantity allowed on board. If the requested HM is not on the authorized list, or if the quantity ordered exceeds the allowed quantity, the requisition would be rejected with a warning to the user.

Because CM+ was originally designed as a logistics configuration management system, it does not yet have a module that will enable safety personnel to ensure that each HM ordered has an up-to-date Materials Safety Data Sheet (MSDS). As discussed in Section 1.2.1, the MSDS is required by OSHA regulation whenever a hazardous substance is stored or used.

### 3.1.2.3 *Industrial Facilities*

Unlike the aviation and vessel communities, the industrial facilities had not had a single Program Manager at the headquarters level (although since this study was completed, Commandant (G-SLS) has taken on that role). There is no single automated information management system collecting HM/HW information at industrial facilities, yet they are the CG's largest users of HM and generators of HW.

Because of the diverse nature of their operations, the industrial units gathered operating information, including required HM/HW information, in a variety of formats. Some used manual log books. Some relied on paper files containing purchase orders and receipts for HW hauled away. Some larger units had simple automated systems. The quality of HM/HW management and associated reporting varied widely, depending on the training of the HM/HW personnel and the labor hours available for recordkeeping. Even among shops located on the same facility, industrial unit HM acquisition and tracking records varied widely in format and detail. However, because of the volume of HW waste they generated, these facilities were frequent targets of state and local enforcement actions. This combination of visibility and lack of consistent data collection made the industrial facilities a major weak point in the CG's environmental compliance program.

A number of industrial facilities aggressively attempted to overcome these problems through a combination of central HM/HW management and some form of automated inventory system.

One notable example was Base South Portland, Maine, which became a test facility for an Environmental Protection Agency (EPA) project to analyze problems associated with the EPCRA regulations. The Computer Aided Materials Management System (CAMMS) was an outgrowth of this joint EPA/USCG project. The goal was to examine actual field problems and develop and test solutions that could benefit other federal or commercial facilities that must comply with EO 12856. The test, named the EPCRA & P2 Partnership Pilot Project, involved the Base South Portland, the University of New Hampshire, and EPA-New England. A portion of the project developed an HM/HW information management system using commercially available database software. Development was done by the University using dBase III running on MS-DOS. University students assisted with the initial inventories of materials and the associated data entry. The system used barcodes to track hazardous substances from receipt on the facility through entrance into the waste stream. CAMMS had a field for the barcode, which was not a universal product code but was locally assigned to meet specific CG requirements. The Hazardous Materials Coordinator (HMC) maintained the master list in a spreadsheet. The results of this project were presented to CG and other agency personnel at a workshop sponsored by Base South Portland.

### **3.1.3 Hazardous Materials Minimization**

There are many reasons why hazardous materials minimization is a critical component of a Hazardous Materials Management program. In addition to reasons addressed in other sections of this report, the Resource Conservation and Recovery Act requires facilities generating large quantities of hazardous waste to implement a waste minimization program. It is CG policy that waste minimization efforts be carried out by each unit to the greatest extent possible. Since hazardous materials (used or unused) become the primary constituents of HW, HM minimization should be a major focus of any HW minimization program.

## **3.2 EPCRA MANUAL**

At the December 1992 Hazardous Waste Assessment Conference (see Section 2.1), LCDR Rich Van Lear of Support Center, Portsmouth, VA presented information about "Portsmouth's Environmental Vision." This program later became the prototype for the CG's Emergency Planning and Community Right-to-Know Act and Pollution Prevention (EPCRA/P2) program and manual (Commandant Instruction M16455.10). Novel approaches identified included concepts for a "Pollution Prevention Officer," a central "HAZMAT Issue Facility," an aggressive Hazard Communication program and the beginnings of an Authorized Use List program.

As discussed in Section 1.2.1, Executive Order Number 12856 (the EO) requires all federal agencies to comply with the planning and reporting provisions of the Emergency Planning and Community Right-to-Know Act (EPCRA) and the Pollution Prevention Act (PPA). Further, the EO requires all agencies to implement policies and practices which emphasize pollution prevention (P2) in how they achieve compliance with EPCRA and all other environmental regulations.

To put these requirements in perspective, the Hazard Communication program (required by OSHA and administered by the Safety and Environmental Health Division) requires that units maintain an inventory listing of "what" hazardous materials are being used. EPCRA adds the requirement to track "how much" hazardous material is being used; and P2 requires that the CG "reduce" the amount of hazardous material that is being used.

Commandant Instruction M16455.10 identified the minimum requirements necessary for compliance with EPCRA. It established hazardous materials management and procurement controls as the initial and most

fundamental Coast Guard P2 requirements, and it established the mechanism to measure the success of the CG's P2 efforts.

Two of the requirements of the instruction are that Commanding Officers of Coast Guard operational and support units that use or store hazardous materials (Group and above) shall: (1) implement and maintain a Hazardous Materials Management System (HMMS); and (2) implement and maintain strict procurement controls for the purchase of hazardous materials.

According to the instruction, the HMMS is any organized method to record data about hazardous materials used at a facility/unit. The methods, format, and amount of data recorded varies depending on the need and use for the information. The HMMS can be as sophisticated as a centrally managed, completely integrated computer system that tracks procurement, issue, and wastes. A host of features can be designed into the system such as: links to MSDS databases; barcode labeling for inventory control; and system security to allow materials issue only to pre-authorized personnel. At the other extreme, the HMMS can be as simple as handwritten or word processor logs.

A recommendation from the Group New York study (see Section 2.4) was that the PPC should oversee all aspects of hazardous materials purchase, storage, use, reuse, and recycling and hazardous waste disposal. It is also recommended that all of the units within the Group appoint a unit PPC to coordinate unit P2 efforts with the Group PPC.

### **3.3 ISSUES & CONCERNS**

During the course of the early studies (workshops, meetings and field visits), many issues and concerns related to the current process were identified; the major ones are summarized in this Section.

The CG has a continuing need to provide environmental information to Congress, the Department of Transportation (DOT), the Environmental Protection Agency (EPA), state regulatory bodies, and local officials. In addition, CGHQ personnel, especially program and engineering systems managers, as well as intermediate environmental staffs, need access to field data, particularly HM use and HW generation, to determine the effects of new HM/HW laws and regulations on CG activities. Field units carry the majority of the burden of gathering, managing and reporting this information.

There is a wide-spread perception of conflict between mission-critical operational needs and environmental concerns. Environmental compliance is not seen as an integral part of the mission, but as an additional tasking. This situation will continue to get worse as downsizing and work force reduction initiatives are implemented.

The complete life cycle (procurement through disposal) is managed by different offices (field and staff) whose goals are not always compatible. HM/HW roles and responsibilities are often poorly coordinated. Supply offices (which are connected to Commandant (G-SLS)) and individual shops are responsible for procurement, storage and transportation. Safety and environmental health personnel and Hazardous Material Coordinators (HMCs) (connected to Commandant (G-WKS)) are responsible for hazard communication and MSDSs. Public works personnel and Pollution Prevention Coordinators (PPCs) (connected to Commandant (G-SEC)) are responsible for hazardous waste management and pollution prevention. At multi-unit facilities, there can be a lack of coordination between host and tenant PPCs. Waste minimization, EPCRA, and other EPA regulatory requirements are facility-wide issues while P2 and safety are unit-specific issues.

Many units (especially large industrial facilities) have been working independently to develop or acquire methods for electronically tracking HM/HW information. Since HQ has not set a standard for these systems, they are all different, mostly incompatible, and there is no method to centrally capture and/or compare the data.

Most HW reduction and Pollution Prevention efforts in the CG are driven by personnel who are self-motivated to comply with environmental regulations and instructions. This motivation is based on their belief that the regulations and instructions are worthwhile, even though they may receive little personal recognition. However, other personnel give a lower priority to environmental activities simply because they are not held accountable for them. The CG needs to make major changes in the culture to ensure that the successes become permanent fixtures.

Historically, the acquisition and maintenance of HM inventory data was a shop-level responsibility, and any standardization was usually within a command. Facilities that had tenants reporting to different commands usually lacked coordination in HM acquisition. Under EPCRA, the primary control and data collection point for HM type and quantity information is the Hazardous Materials Coordinator (HMC)/Pollution Prevention Coordinator (PPC) acquisition approval process. This process is paper-intensive and not always implemented effectively.

Some units lack incentives to minimize HM because they are not held accountable for the cost of HW disposal. Tenant units that buy HMs may not be motivated to minimize their use, because in many instances, the units do not have physical or fiscal responsibility for HW disposal.

Storekeepers are the first physical control point in the HM/HW management life cycle. They are primarily administrators, not warehouse personnel or logisticians. Their minimal training in HM inventory management does not prepare them for their critical role in HMM.



## **4.0 IMPROVED PROCESS [DESIRED STATE]**

### **4.1 GENERAL**

Hazardous Materials Management is a series of tools to control the procurement, distribution, and use of chemicals. Proper HMM practices allow facilities to ensure that chemicals are properly purchased, issued and used to meet process requirements, protect worker health and the environment, and limit the amount of unused materials requiring disposal. HM tracking can assist facilities in:

- Identifying less hazardous or non-hazardous material substitutes;
- Reducing the amount of materials that exceeded expiration dates or shelf-lives;
- Ensuring the appropriate chemical is used for the job;
- Ensuring chemicals are used and disposed of or recycled in a safe and proper manner;
- Maintaining chemicals in proper storage to protect the container and chemical integrity, to reduce leaks and segregate incompatible materials;
- Ensuring that recertified products are not mistakenly disposed of as waste;
- Preventing unsafe storing and unauthorized stockpiling of chemicals that may lead to permit violations, unsafe working conditions, and outdated chemicals; and
- Limiting the borrowing and handling of chemicals among employees not authorized or trained to handle the chemicals.

A thorough review of government (including CG) and commercial HMM programs identified the following key elements for HMM success:

- Procurement control (controlling purchasing and managing materials requirements);
- Inventory control (minimizing on-site storage and improving use and reuse of materials);
- Prototype control (standard techniques for test and approval of substitute materials);
- Usage reduction;
- Data management (standard data formats and easy access to data);
- Good housekeeping; and
- A process that is as transparent as possible to the technician.

The optimal method for applying these elements to CG facilities depends on (1) the size of the facility, (2) the processes conducted there, (3) the hazardous waste generated, and (4) the amount of HM that needs to be managed.

There are many examples of successful hazardous materials management programs in the CG, Department of Defense (DOD), and industry that have incorporated one or more of these elements, but unfortunately there is no single program that can be applied to all CG units. The programs range from micromanagement to macromanagement of materials, based on the size of the facility. For example, materials needs and purchasing processes were very different for small boat stations vs. support centers, air stations vs. cutters. From a review of the CG programs that have been implemented, it is clear that the “improved process” we’ve been searching for is not one improved process, but technical elements of proven processes tailored to the size and scope of each facility.

### **4.2 DEPOTS**

Two places in the CG warrant micromanagement of hazardous materials similar to the large DOD programs: the Aircraft Repair and Supply Center in Elizabeth City, NC and the Coast Guard Yard in

Curtis Bay, MD. As discussed in Section 2.9, the DOD Functional Economic Analysis at ARSC identified the economic benefit of a formal HMM program (DM-HMMS) residing on a UNIX-based business server. Although the FEA did not recommend a similar system for the Yard (due to efficiencies achieved during their ISO 9000 certification), the volume of materials used there would still lend itself to a formal, computerized HMM system, either DM-HMMS or HICS. (Note: DOD no longer encourages the use of DM-HMMS, but now supports the Hazardous Substance Management System (HSMS) as the DOD standard.)

### **4.3 LARGE FACILITIES**

All large CG facilities have a need for inventory control and data management. For large facilities with multiple units, facilities that generate large quantities of hazardous waste, or facilities dealing with air regulations, some form of inventory tracking system is essential. For a permitted facility, inventory management is mandatory, including the need to manage procurement. If a unit has central management for other commodities, they should manage HM the same way.

For larger facilities, centrally managing hazardous materials at the beginning of the maintenance process will produce savings in both labor and reduced disposal cost. There are many advantages to the centralized management of hazardous materials. Central management yields improved standardization between shops, reduced quantity purchased and reduced waste generated by the disposal of excess, unused and outdated materials. Beyond the logistical saving associated with centralized purchasing and management, there are quantifiable personnel savings that result from the elimination of the unfunded requirement for shop generated procurement request, receipt, storage, management and annual inventory reports required for HM.

### **4.4 INTERMEDIATE FACILITIES**

Every facility above small quantity hazardous waste generator (SQG) should have some form of inventory control and data management, the question is how much is appropriate. Deciding what level of inventory control is necessary is a judgment call for the command with the help of the Maintenance and Logistics Commands and/or headquarters.

Facilities that generate small quantities of hazardous waste need some form of inventory control. They need to look for where the materials are coming in and stop the flow of excess. A small boat station where the Executive Petty Officer approves all purchases most likely already has adequate, centralized procurement control.

### **4.5 SMALL FACILITIES/UNITS**

Facilities that are conditionally exempt small quantity hazardous waste generators by definition are not producing much waste, so they probably have an inventory control system that works great for them (they tend to be of a size that they don't have extra funds to spend on unneeded materials, and excess materials are readily identified). They just need to know what data to capture and report, and suggestions for the easiest way to manage it.

## **5.0 PROCESS IMPROVEMENT**

Hazardous Materials Management functions include identification, receipt, storage, issue, and turn-in. In recent years formal HMM programs have emerged within the Department of Defense (DOD), other government agencies and industry which have presented opportunities for improved efficiency in the CG.

### **5.1 GENERAL**

The HM/HW Information Management Study (see Section 2.5) made the following recommendations for CGHQ:

- Develop authorized chemical use lists for all major users in the aircraft, vessel, and industrial facility communities. The lists should be developed from baseline HM data, determined through HM use requirement audits. HM managers should proactively search for less hazardous, appropriate substitute materials.
- Streamline the HM procurement process by establishing a central control point at each facility for HM ordering and using an automated system to determine if the HM is authorized for use and the quantity requested is within limits.
- Establish a central HM inventory control point for each facility to track locations and amounts of HM used and to identify sources of HW.
- Use the HMC/PPC labor hours saved through streamlined acquisition processes to identify P2 and HM use reduction opportunities in accordance with EPCRA/P2 requirements.
- Mandate structured inspections based on checklists to audit the contents of HM storage areas to ensure compliance.
- Establish a corps of uniformed personnel trained in HM/HW management who can carry expertise from one assignment to the next and who have sufficient understanding of HM/HW issues to respond to unique local requirements.

### **5.2 POLICY**

The Systems Directorate (Commandant(G-S)) needs to develop an integrated CG-wide HM/HW management program that covers all aspects of the HM/HW life cycle. This program should clarify, streamline, and integrate the organizational roles and responsibilities for the complete life cycle of HM/HW management, including standardizing processes and information gathering procedures.

A comprehensive HM procurement policy needs to be part of the overall HM management program. This policy should be implemented by revising instructions and manuals covering all types of HM purchases. Personnel working in operations, procurement, shipping and receiving, and inventory management will be better able to control and reduce HM volumes if their instructions directly address HM procurement procedures.

All pertinent programs and senior operational commanders should designate an HM manager to integrate HM/HW management with operational missions, and to foster full life cycle management of HM/HW from identification of need through disposal.

Set and enforce standards to ensure that all units collect required HM/HW data in a consistent format, accessible to any person with a need to know at any level of CG operations.

Monitor changes in Federal and State reporting requirements and ensure that any required changes are made in HM/HW data collection standards.

Require units to have a HMM plan (include example in policy). Many units already have similar instructions (e.g., waste minimization, that can be used as examples).

All commands should plan and budget for their HM/HW management requirements, along with their requirements for buying HMs and disposing HWs. They should communicate substantiated requirements up their chain of command.

Unit HMM plans should include a thorough evaluation of unit industrial processes, hazardous material use, unit hazardous waste streams, hazardous material use reduction activities, environmental compliance status, and both senior responsibility and total quality management oversight of the HMM program.

All commands should incorporate environmental compliance and P2 concerns into their existing internal audit/inspection processes. These audits/inspections will make it clear to field personnel that the management chain is committed to environmental compliance.

All commands should incorporate environmental compliance and P2 with operational missions, and foster full life cycle management of HMs/HWs identification of need through disposal. HM/HW management activities should not be perceived as additional tasking, but as actions that are integral to the operational mission.

Provide incentives to all operational units, including tenants and support units, by developing objective measures for gauging the effectiveness of HM/HW management. These measures should be used in audits/inspections, and in individual performance evaluations. (There is inadequate information to establish a baseline to measure (P2) improvements, as mandated by EO 12856.)

HM purchases should be based on actual needs. Units should not be allowed to stockpile HMs. Purchases that exceed near-term needs should be disallowed. Restrict purchases of HMs that have limited shelf life, so that they will be used within the shelf life period. These recommendations require knowing a unit's actual consumption rate for an HM, the HM's shelf life, and the volume on hand.

Program level HM managers should develop and maintain Authorized Chemical Use Lists, developed from baseline HM use data, determined through HM use requirement audits.

Program level HM Managers should also develop an HMM procedure that is usable for all units. The first step is for HM user programs to analyze their industrial processes and conduct an HM use requirement audit. The second step is for Program-level HM managers to determine what inventory is required to meet minimum HM use needs. This procedure should include, but not be limited to, an inventory process that will allow the CG to develop baselines on HM quantities and analyze trends.

### **5.3 MATERIALS MANAGEMENT**

The ideal way to prevent pollution and control exposure to HM is to control their purchase, use, and entrance into the waste stream. Strict inventory control is an integral part of hazardous materials management. Inventory control at the shop level can be improved by:

- Establishing policies stating that only a minimal amount of material can be purchased or removed from the central stock area at any time, as needed. In most cases, shops' supply should be 1-2 weeks (or sufficient to finish current job(s), whichever is longer).
- Practicing first-in first-out (FIFO) inventory control, i.e., use older materials before new raw material. When possible, assign control over HM supplies to a limited number of individuals trained to handle HM and who understand the FIFO inventory policy.
- To discourage stockpiling, shop level storage capacity should be reduced to allow only for a reasonable supply, as determined by the shop supervisor.
- Providing a simple and convenient solution to the problem of returning unused portions of materials to the central area.

The EPCRA Manual requires all CG units to implement hazardous material procurement controls. This includes identifying all HM that are stored and used at the facility, ordering minimum quantities, and not exceeding a 60 day supply of on-hand quantities. It also requires a Pollution Prevention Coordinator review of all purchases (government and commercial). Most facilities will benefit from a consolidated purchasing office (to actually purchase the materials, not just process the paperwork).

Efficient and effective hazardous materials management at large facilities usually requires the use of a central supply and distribution network to assure that the operations are provided with materials on an as-needed basis. A real-time inventory is essential to determine the available stock on hand, the materials committed to filling repetitive needs, and the expected restock dates. Table 2 gives the process for establishing a HAZMAT Center. A description of the Navy's prototype program (Point Mugu) can be found in Appendix A, and the Coast Guard facility prototype (ISC Portsmouth) in Appendix B. The description of a prototype shipboard program (USCGC Munro) can be found in Appendix C.

One of the most critical needs identified in the studies was standardized HMM support for the CG's large industrial facilities. The Engineering Logistics Center (ELC) established a program to meet this need by assisting Integrated Support Commands with setting up "HAZMIN Centers." Following the prototype development at ISC Portsmouth, they've adjusted the Navy's standard HICS protocol to CG facilities and use a DOD Tiger Team to assist in the transition process. This is an important first step in solving the CG's HMM problem. The CGHQ Pollution Prevention Committee has recently chartered a steering committee to develop CG-wide policy guidance and funding for this program. Until a policy is promulgated, this program is voluntary. It may be tailored to suit each command's needs, and can be a valuable tool for controlling HM inventories, thereby controlling hazardous waste (Commandant (SEC), 1998).

Whether a facility/unit would benefit from centralization depends primarily on the amount of hazardous materials that are handled, and how efficient their current system is at preventing the generation of hazardous waste from unused materials. At a minimum, small units should coordinate purchases among shops to avoid duplicating orders. We were unable to determine the critical "break-even" point for centralization.

Personnel needed to establish and run the Center will depend on the size and complexity of the facility. For example, the personnel projections for Group Astoria were a second or third class storekeeper for two years to establish inventory high/low levels, accounting and distribution records; process procurement requests; and research alternative products. They would also require a permanent billet seaman to assist in the physical aspects of establishing the Center and then become the system manager.

Because the management of HM is a logistics issue, the logical place for oversight of the HMM program is probably the Supply Office (since it is a supply and distribution program). The success of the program would be based on controlling the materials before they are purchased, not after. The only common point in each of the different routes for HM to be ordered and/or received is usually the procurement section of Supply.

One example of a successful program set up by the Supply Office at a small to medium sized facility is Group Galveston, TX. In August 1996 representatives from CGHQ, CG Engineering Logistics Center (ELC) and RDC visited Group Galveston to see their hazardous materials pharmacy. The mission of their HAZMAT pharmacy is to provide a single point of control and management for the distribution and use of all hazardous materials brought onboard the base. The primary functions of the pharmacy include receiving, segregation, control, distribution, reuse/recycling, and storage. Responsibility for the control and management of HM inventory replenishment resides with the Supply Division. The pharmacy is the sole source of supply of HM to base organizations. A computerized database (automated data processing) is the primary control mechanism for the pharmacy.

#### TABLE 2. ESTABLISHING OF HAZMAT CENTER

For units that choose to develop a HAZMAT Center, the following procedure may be used:

1. Determine ACUL for each shop/tenant (process used by G-SEA to develop aviation's ACULs):
  - Establish working group for each "target" (process, unit, vessel class, etc.)
  - Describe basic processes
  - Outline the steps in that process
  - Identify chemical products (type and amount) necessary to perform process (required maintenance, etc.)
  - Review each chemical requirement for substitution or elimination
  - Eliminate outdated requirements
  - Eliminate Ozone Depleting Substances (ODS) and any other banned materials
  - Substitute less hazardous chemicals wherever possible
2. Consolidate ACULs into a HAZMAT Center master inventory list.
3. Establish inventory high and low limits based on shop/tenant anticipated needs (limits should be adjusted in future years based on actual usage.)
4. Collect all materials from shops/tenants, except the agreed upon local supply.
5. Determine methods issuing of and payment for materials.
6. Establish inventory tracking system (see Section 5.3) and Center resupply procedures.

## 5.4 INFORMATION MANAGEMENT

To fulfill its commitment to an aggressive environmental program that fully supports compliance with Federal, State and local environmental laws and regulations, the CG must have accurate, uniform, timely, and easily accessible HM/HW information (type and amount) at all levels of operation. At a minimum, the CG needs a relational database on a centrally maintained server that can receive data from the field and respond to ad hoc inquiries.

The ability to track the purchase and use of HM is of utmost importance to any facility or unit P2 program, and is required by the EPCRA Manual. The type of HMMS implemented at the unit level is left to the discretion of the unit commander. It can be as sophisticated as a centrally managed, completely integrated computer system that tracks procurement, issue and waste; or as simple as handwritten or word processor logs.

Comprehensive chemical use tracking at large facilities involves using a computer system to track the procurement, storage, distribution, use, and disposal or recycling of each and every chemical used. Workers fill out a request form for each material. The requester must justify the HM by describing the process for which it is intended, and the material's proposed use. Before receiving the material, the requester's HM training level, the HM's intended use, the quantity requested, and the material's hazard are checked against the computer database. Without authorization, the HM cannot be issued. If authorized, instructions on how to use and recycle or dispose of the material are issued along with it. The most cost-effective system currently available that matches the CG needs for large to medium-sized facilities (except ARSC and the CGY) is the Navy's HICS program (see Sections 2.1, 2.7, and 2.9).

Tracking of on-site locations and amounts of materials can be facilitated by use of a system of bar codes applied to containers and to shelves or cabinets containing the materials. Computerized systems can cross reference the information, giving exact location and quantity information on materials. When issued to users, containers can be given a unique code that records the chemical content, the recipient, the date it was issued, the chemical's intended use, and the material's expiration date. This allows the material to be tracked from the time it is issued to disposal.

A facility that has a computerized centralized purchasing system that logs and identifies all materials can prepare a summary report to identify the materials brought on site during the year. Facilities that lack a centralized record-keeping system for purchasing will need to consider individual purchasing or delivery records unless the amount of the various chemicals present on site can be determined from a review of the storage and stockpile areas.

Previous to the CG's decision to transition to a Windows NT operating environment for its service-wide computer system, the following suggestions for HM information management were made:

1. The large industrial facilities (ISCs, formerly support centers and bases) need a standard method now for managing HM/HW information. There are three possibilities for a short term solution:
  - A. Acquire commercial software and the hardware to run it (most probably DOS or Windows based PCs);
  - B. Acquire government-supported software and the hardware to run it (most probably DOS or Windows based PCs, which can eventually be converted to the new CG standard workstation);

- C. Develop CG-supported software to run on the current CG system then convert to the new system.
2. For the long term, the CG needs a system with the following characteristics:
- A. A relational database on a centrally-maintained server to allow for external access, queries, and data transfer among units, and between field and management;
  - B. Data compatibility of all systems (large and small units, field and staff) in use for both HM use and HW generation. Data should also be compatible with external recipients of reports, e.g. EPA's TRI (Toxic Release Inventory) report and Defense Reutilization and Marketing System (DRMS) waste profiles;
  - C. Data captured on the current CG standard workstation and other systems will need to be transferred to the new standard.

In addition to the HMM information system, the HM/HW Information Requirements Study recommended that CGHQ ensure accurate and timely information for field personnel by evaluating and, if appropriate, arranging for electronic distribution of HM materials characteristics tables, updates to MSDSs, reclassification of HM hazard classification, and similar information available from EPA, OSHA, DOD, and other organizations concerned with HM/HW issues. They also recommended an HM/HW data administrator to set data standards for all new development and to work with owners of existing systems to achieve data compatibility to the greatest extent possible.

## **5.5 HAZARDOUS MATERIALS MINIMIZATION**

Minimizing the amount of hazardous chemicals used by substituting with alternative, less toxic materials is a vital part of effective hazardous materials management. Less toxic materials generate less toxic waste, which increases the opportunity for reuse, recycling, and less expensive disposal. Traditionally in the CG, this type of substitution has been conducted on an ad hoc basis in the field, primarily in response to sales pitches from manufacturers of alternative products and processes. The testing and analysis of prototype alternatives needs to become a standardized, institutionalized process with the results made available to all program managers and field and support units.

The controlled prototyping procedure designed by Commandant (G-SEA) (see Section 2.7.3) and the coatings process analysis study (see Section 2.10) provide a good starting point for a structured test and evaluation protocol. Aviation-related prototyping efforts are centrally managed by the Industrial Systems Manager (ISM) at the Aircraft Repair and Supply Center (ARSC), so that alternative chemicals or processes are tested and evaluated once, with the results being made available for all Air Stations to review. The Coatings Analysis study established standard methods for conducting coating and coating removal product and process evaluations and recording and reporting the results. It will allow the engineering programs to have one place to send new products and processes for evaluation. This will reduce the time and costs associated with introducing new, preferably environmentally friendlier, products and processes to the field.

Testing is required to validate substitutes or alternatives to hazardous materials. In most instances, a battery of materials-oriented testing has already been accomplished on the material in question. For instance, if a material is qualified to a military specification, the test requirements are in the specification. It will be up to the appropriate program manager to determine if the qualification testing is adequate. If it is insufficient, additional testing will be required, either to additional specifications or to individual tests such as industry accepted testing protocols.



Testing/prototyping for non-specification materials is a more complex issue. It is recommended that the CG establish a central program and standard procedure for alternative analysis. The central program would assist the individual program managers in identifying appropriate tests and determining pass/fail criteria. Alternatives need to be tested for specific applications, the results documented and information shared with other programs. Following the coatings process model, the central program would gather baseline information on HM use in CG industrial and maintenance processes, maintain the database with baseline and alternative data, and use the database and a decision model to analyze new HM-related products and processes.

## **5.6 TRAINING**

The quality, effectiveness and success of the Coast Guard's hazardous materials (and hazardous waste) management program will depend on the quality of the training provided to those responsible for its implementation. Virtually every person in the CG has some level of responsibility for the proper management of HM/HW. Therefore, personnel at all levels must have training concerning their respective role within the global HM/HW management program, as well as their specific HM/HW roles and responsibilities.

Recommendations from the various studies for training in minimization, HM/HW awareness and program management include four (4) hours for enlisted (boot camp) and eight (8) hours for officers (Coast Guard Academy/Officer Candidate School). All leadership/professional training (including PCOs and PXOs) should include global HM/HW management issues in the curriculum. This will enable the CG to create leaders who are capable of achieving environmental excellence. Service schools should include task-specific HM/HW training. Some of the specific HM/HW training requirements include inventory management, logistics, safety, and hazard communication (HAZCOM). Proper HM/HW management should be taught as an integral part of each task. In this way, personnel will not see HM/HW management activities as additional tasking, but as part of the job. A corps of trained HM/HW specialists (probably in the SK rating) who carry their expertise with them from one assignment to the next is strongly recommended to ensure the reliability of the basic HM/HW data. Supply personnel should be trained as purchasers, and should develop corporate knowledge of product and supply management.

The CG should develop a qualification program for HM/HW-related assignments. For example, personnel assigned to Pollution Prevention Coordinator (PPC) duties would have to be qualified for the job, based on training and on a demonstration of specific knowledge, skills and abilities. This in turn would require that senior personnel (usually Engineering Officers) be trained to determine the qualifications of the PPC. There should also be formal pipeline training for PPCs, preferable at a service "C" school. Contract project managers and Contracting Officer Technical Representatives should have HM/HW training so that they can plan for and effectively manage contractor HM use and HW generation.

## REFERENCES

A. F. Meyer and Associates, Inc., "Informal Technical Information Report - Hazardous Waste Assessment for the USCG," December 1992.

A. F. Meyer and Associates, Inc., "Hazardous Waste Assessment Report - Phase I," July 1993.

Commandant (G-SEC), "Hazmin Centers Promote Pollution Prevention at CG ISCs," Environmental Times, Issue 97-6, December 1997/January 1998.

Database Graphics, "AIRTOX Reference Manual," 1993.

Environmental Protection Agency, "Facility Pollution Prevention Guide," 1992 (EPA/600/R-92/088).

Fitzpatrick, Michele, "Pollution Prevention Opportunity Assessment Implementation Plan, Aviation training Center, Mobile, Alabama," November 1994.

Letter from Commanding Officer, Coast Guard Cutter MUNRO (WHEC 724) to Commandant (G-SEN), "WHEC Environmental Compliance Program," January 1996.

OGDEN Government Services, "Information Process Validation Document, Hazardous Materials/Hazardous Waste Information Management Description," November 1994a.

OGDEN Government Services, "Environmental Information Policy Recommendations Report," November 1994b.

OGDEN Government Services, "Hazardous Materials/Hazardous Waste (HM/HW) Information Management, Implementation Plan For Improved Business Practices," March 1996.

Payne, Ed, "NAWS Point Mugu Consolidated Hazardous Material Reutilization and Inventory Management Program Manual," Aircraft Maintenance Department, Naval Air Weapons Station Point Mugu, CA, 1992.

Peri, Ric, "A Logistical Solution to an Environmental Problem, the Hazardous Materials Management Plan for the Aeronautical Engineering Community," September 1995.

The MITRE Corporation, "Case Study: Hazardous Materials Management at the Naval Air Weapons Station, Point Mugu, California," February 1993.

TRC Environmental Corporation, "Pollution Prevention Opportunity Assessment, United States Coast Guard Aviation training Center, Mobile, Alabama," April 1994 (EPA/600/R-94/156).

USCG Research and Development Center Environmental Safety Branch, "Hazardous Materials Inventory Control and Management, Preliminary Report for Group New York," November 1994.

## **APPENDIX A - POINT MUGU CASE STUDY**

In 1990, the Navy established a goal of reducing hazardous waste generation by 50 percent by 1992. The Point Mugu Naval Air Weapons Station established a similar goal to reduce the procurement of hazardous materials in its aviation industrial complex by 50 percent before the end of calendar year 1992. Concurrently, the California legislature mandated a reduction in waste generation, both hazardous and nonhazardous, of 25 percent by 1995 and 50 percent by 2000. The desire to achieve these goals coupled with the need to comply with the increasingly strict environmental regulations demanded a change in hazardous materials procurement and management practices at Point Mugu.

In response to these challenges, Point Mugu established a hazardous materials minimization (HAZMIN) program. Responsibility for the program was assigned to the commander of the Aircraft Maintenance Department (LCDR Ed Payne). He was given full autonomy in the implementation of the program, including authority to divert any necessary resources from existing base operations.

The program was based on four guiding principles:

- Central procurement, inventory, and issue control over all aviation hazardous materials including paints, coatings, lubricants, greases, and sealants;
- Maximum reuse of materials on base;
- Recycling of materials that cannot be reused; and
- Disposal of materials as a last resort.

The HAZMIN program established a hazardous materials warehouse which assumed responsibility for the storage, management, and issue of all hazardous materials used in aircraft maintenance. All existing material stocks were collected from shop storage areas and were incorporated into warehouse inventory. Authority to requisition materials from Base Supply was granted exclusively to the warehouse.

The warehouse determines the level of material inventory to be maintained and submits requisitions to supply accordingly. Inventory levels are set based upon customer operational plans and schedules. Base Supply is informed of anticipated changes in material usage patterns. Materials are delivered to the warehouse then transferred from standard supply units into smaller package units that match the material quantities actually needed for ongoing maintenance activities. All warehouse inventory is tracked and issued in these smaller quantities.

As material requirements arise, shop personnel contact the warehouse and request the required materials. Warehouse personnel take the order, ensure that all necessary approvals are in place, restrict deliveries to a single day's supply of material, deliver the necessary materials, and update inventory records accordingly. Warehouse personnel also collect unused material and return it to warehouse inventory for reissue. In addition, shop wastes are removed along with empty material containers.

These practices allow the strict control of material issue, establish central control of material stores on base, and generate historical records of material usage. Warehouse personnel also monitor the remaining shelf life of on-hand stocks and reduce the frequency of shelf life expiration by ensuring that aging inventory items are issued in response to current requests. The consolidation of requisition authority and the inventory management in the warehouse coupled with communication with Base Supply establishes firm control over hazardous material issue and procurement. As an added feature, shops are relieved of the responsibility for hazardous material and hazardous waste storage.

Initial records in the warehouse were established using handwritten information on index cards to track inventory on hand, requests for materials, and requisitions submitted to Supply. Eventually the customized Hazardous Inventory Control System (HICS) was developed to the specifications of the HAZMIN program and is the central repository of program operating information. This system operates on a personal computer and includes capabilities (using bar code processing) for material receipt, order entry, material issue, inventory management, container tracking, and report generation.

Point Mugu started with one department (aircraft maintenance) as a prototype. After operating for three months, the program began to add additional base and tenant organizations as customers at the rate of approximately one per month. This phased implementation allowed the extension of the program to the entire base in a controlled fashion.

Point Mugu's procedures for interacting with an established warehouse customer, accepting new customers into the program, and replenishing warehouse stock are well documented and have been published in many forms.

The program added recycling responsibilities and immediately launched an aggressive material reutilization and recycling program. Secondary uses are sought for materials with expired shelf life. Those which have no alternative use are recycled. Disposal is reserved as a last resort.

To be successful, a program like this requires a facility, support equipment, personnel, and information management. The operation of Point Mugu's HAZMIN program is labor intensive, and personnel are diverted from other assignments. Warehouse customers are required to provide staff for the warehouse according to a formula based on the number of personnel in the customer organization.

The accomplishments of this program can be described quantitatively in financial terms and qualitatively in terms of capabilities. No formal economic analysis of this program has been released; however, a number of significant results have been identified. The Aircraft Maintenance Department achieved the target reduction in procurement of hazardous materials (58 percent) a year earlier than the Navy's goal (50 percent in two years). The program has significantly reduced both the number of hazardous materials requisitions processed by Base Supply and waste disposal costs.

In addition to financial benefits, the program has provided management capabilities that were unavailable previously. New inventory control and management practices provide the basis for identifying duplicate materials that can be removed from inventory and allow adjustment of inventory levels based on actual demand. These records also support environmental compliance reporting with accurate records of inventories and usage of hazardous materials.

The success of the HAZMIN program at Point Mugu has prompted the Navy as well as DOD and other agencies to plan for the implementation of this program.

## **APPENDIX B - HAZMAT CENTER PROTOTYPE**

In FY96 SPCO Ric Peri of the Aeronautical Engineering Division (Commandant (G-SEA)) assisted the CG Environmental Management Program in development and implementation of a prototype hazardous materials management program (HAZMAT Center) at Integrated Support Command (ISC) Portsmouth, VA. This program was modeled after the one developed by Point Mugu Naval Air Weapons Station (see Appendix A). ISC Portsmouth was selected for the prototype because of its large number of industrial shops using hazardous materials and the number of tenants reporting to different program offices.

This facility consists of 21 separate commands, including an industrial facility, large cutters, buoy tenders, small boats and support commands all co-located at a central facility. SPCO Peri organized the development and implementation teams, performed the audits and assessments and met with all tenant commands to discuss and resolve their concerns.

In this prototype, the HAZMAT Center was designed to provide customer support to meet the hazardous materials (HM) needs of the ISC and tenant commands. The goals were to:

- Minimize employee exposure to HM
- Minimize and monitor the type and amount of HM used
- Reduce hazardous waste through improved inventory control
- Reduce costs
- Ensure compliance with all federal, state, local, and CG environmental and safety directives.

The HAZMAT Center became a centralized inventory control point for all HM except compressed gas, office, medical, and food products on ISC Portsmouth. The Center ordered all HM through the ISC comptroller via the HAZMAT Center Supervisor. The Center was designed to manage HM by:

- Maintaining each tenant's Authorized Chemical Use List (ACUL)
- Maintaining an adequate HM inventory to support anticipated tenant needs
- Issuing HM

Bulk HM is stored at the Center and the Center Manager maintains an appropriate inventory level, based on use rates. HM is issued only to those individuals designated in writing by the Commanding Officer as being authorized to request and sign for HM. Only materials listed on an ACUL are issued to a representative of that unit.

The responsibilities for the Center are as follows:

### **Chief, Environmental Branch:**

- Supervise the HAZMAT Center Manager
- Provide funding for daily operations of the Center
- Receive quarterly funding from each customer based on the previous quarter's usage of HM

### **Hazardous Materials Center Supervisor:**

- Manage the HAZMAT Center
- Manage the HM inventory

- Assure that each item on each ACUL is available
- Assure that stocking limits are enforced so that at no time will inventory be less than a 30-day supply or greater than a 90-day supply
- Maintain a master file of Material Safety Data Sheets for each item stocked
- Provide monthly HM usage reports to tenant commands
- Provide quarterly usage reports to the comptroller to aid in establishing unit contributions to Center operations
- Provide and maintain copies of Form DD-1348
- Notify each unit when it reaches its HM ceiling, as established by the unit's fiscal planning
- Provide support for emergency situations

#### **Tenant Commands:**

- Support the HAZMAT Center concept by requisitioning all nonexempt HM only from the HAZMAT Center (at any time the Commanding Officer may elect to purchase or requisition from an external source if necessary to meet the unit mission)
- Provide funding on the first day of each month
- Establish and maintain an ACUL to be used to establish inventory requirements
- Designate individuals authorized to receive HM
- Limit local use supply of HM with a goal of daily use supply not to exceed a 7-day limit except for deployment and special projects
- Notify the HAZMAT Center when anticipated projects or deployments require a higher than normal issue
- Provide chemical information about HM acquired from an outside source to the Center

The foundation of this effort is the unit ACUL. The ACUL is a command instruction that identifies those HM approved for use by the Commanding Officer, as well as the purpose for which the HM are used and the quantity of materials used in a given period. The use of each chemical should be justified based on experience, equipment manufacturer recommendation, or other authority. The ACUL should be updated at least annually and should be reviewed as requirements change. ACULs allow customers and the HAZMAT Center to monitor materials use for reporting purposes and programs designed for HM reduction or substitution with more environmentally friendly products.

Based on the lessons learned during development and implementation of this prototype, the Engineering Logistics Center worked with several members of CGHQ Pollution Prevention Committee (PPC) to design a hazardous material inventory control and minimization program to be adopted at other large CG facilities (primarily ISCs). A Steering Committee chartered by the PPC is working to develop CG-wide policy guidance and funding for this program.

## **APPENDIX C - PILOT WHEC ENVIRONMENTAL COMPLIANCE PROGRAM**

In January 1996 the USCGC MUNRO (WHEC 724) agreed to take on the task of developing the pilot WHEC environmental compliance program, reshaping the ship's approach to the purchasing and inventory of hazardous materials as well as the disposal of hazardous waste. The Pollution Prevention (P2) section of this larger environmental program includes provisions for a hazardous materials management program that provides a useful example for the Coast Guard's large vessels and small units.

To address the P2 issue, the MUNRO's Quality Management Board chartered a Pollution Prevention Quality Action Team (P2 QAT). The P2 QAT's purpose was to examine current shipboard maintenance processes in order to identify those hazardous materials that were stored and used onboard, implement a hazardous materials management system (HMMS), institute procurement controls, and establish long term waste reduction and pollution prevention goals.

The MUNRO also developed and implemented a Pollution Prevention Bill, which is presented below in its entirety so that it may be used by other units as an example.

### **USCGC MUNRO Pollution Prevention Bill**

#### **References.**

- (a) COMDTINST M16455.10, Emergency Planning and Community Right-To-Know Act (EPCRA) and Pollution Prevention (P2) Manual

#### **a. General.**

- (1) To ensure that MUNRO practices pollution prevention as directed by reference (a) and the Commandant's Environmental Policy Statement.
- (2) To limit the quantity of hazardous materials brought aboard by developing a hazardous material allowance list, instituting procurement controls, ensuring a rigorous hazardous materials inventory scheme, and substituting hazardous materials with nonhazardous alternatives where possible in order to reduce the quantity of hazardous waste generated aboard.
- (3) To establish the MUNRO Environmental Working Group to affect continuous improvement in preventing pollution aboard MUNRO.

#### **b. Responsibilities.**

- (1) The Commanding Officer is responsible to ensure that MUNRO practices pollution prevention (P2). The Commanding Officer shall, in writing, designate the Support Services Officer as the MUNRO Pollution Prevention Coordinator (PPC).
- (2) The Executive Officer shall oversee pollution prevention (P2) practices onboard MUNRO by ensuring that department heads are knowledgeable of the contents of reference (a) and are practicing P2 within their departments as outlined therein.

- (3) The Support Services Officer, in his/her capacity as the MUNRO PPC, is responsible for the management of MUNRO's pollution prevention (P2) program and Hazardous Materials Management System (HMMS), shall become knowledgeable of the contents of reference (a), shall develop and oversee the Hazardous Materials Petty Officers and the procedure described below, shall serve as the leader of the MUNRO Environmental Working Group, and shall render the annual Pollution Prevention Scoring System (P2S2) report.
- (4) Department heads shall name Hazardous Materials Petty Officers from each of their divisions using hazardous materials. Department heads shall also name an individual from each of their divisions to serve on the MUNRO Environmental Working Group.

c. Procedures.

- (1) Hazardous Materials Management System (HMMS). Reference (a) recommends that any unit using hazardous materials develop an HMMS tailored to its use level and data recording requirements. MUNRO's HMMS, as outlined below, utilizes a continuous hazardous materials inventory maintained by the supply division, updated by the hazardous materials users, and overseen by the PPC. Procurement documentation is done by the supply division.
- (2) Hazardous Materials Petty Officer (HMPO) Program.
  - (a) The HMPO program is the central feature of the MUNRO's HMMS. HMPOs work together as a team with the PPC to accomplish P2 goals and maintain the hazardous materials inventory in the same fashion as DCPOs work with the DCA to assure damage control readiness.
  - (b) Like a divisional supply petty officer, a divisional HMPO is responsible for ensuring that his/her division is adequately supplied with those hazardous materials necessary for the accomplishment of regular maintenance.
  - (c) Unlike a supply petty officer, an HMPO is responsible for a number of other tasks required by those regulations covering the storage and use of hazardous materials and the disposal of hazardous waste. The duties of an HMPO include, but are not limited to, the following:
    - (1) Maintaining a list of all those hazardous materials required for use by his/her division. This divisional hazardous materials list shall, at a minimum, be reviewed annually. By 1 December of each year, divisional HMPOs shall forward their divisional hazardous materials lists to the PPC for inclusion in the Cutter Hazardous Material Allowance List (CHMAL), discussed below.
    - (2) Observing all hazardous materials storage and inventory management procedures established herein and otherwise by the PPC.
    - (3) Maximizing the use of hazardous materials to minimize the generation of hazardous waste.
    - (4) Ensuring that copies of Material Safety Data Sheets (MSDSs) for all hazardous material used by his/her division are current and are available in all of the following locations:



- (i) The workspace where the hazardous material will be used;
- (ii) The Flammable Storeroom; and, (iii) Damage Control Central.

(5) Labeling all containers of hazardous materials stating, at a minimum, the following elements:

- name of product and manufacturer
- principal hazards
- effects of overexposure on target organs
- proper use procedures
- first aid

(6) Training hazardous materials users on proper use, hazards, first aid, and clean up procedures.

(7) Knowing the contents of this instruction, the MUNRO Hazardous Communications, and Hazardous Waste instructions, and their primary references.

(8) Properly storing, labeling, and disposing of any hazardous waste generated by divisional maintenance procedures in accordance with the Hazardous Waste Management Program.

(9) Looking out for and promoting the use of nonhazardous alternatives to hazardous materials.

(10) Working with other divisional HMPOs to achieve P2 goals.

(3) Cutter Hazardous Materials Allowance List. (CHMAL)

(a) The CHMAL is the list of hazardous materials required onboard for maintenance. The PPC shall, prior to the beginning of each calendar year, develop a CHMAL. The PPC shall take inputs from HMPOs, including Statements of Essential Need (SENs), review divisional requirements, screen for areas of use reduction and product substitution, and publish a final list to the department heads for their use in developing budgets for the required hazardous materials.

(b) The CHMAL is intended to be a static document. That is, it shall only change annually when a division's annual allowance list is approved and added to the CHMAL. Any changes made to the CHMAL or purchase requests for hazardous material in addition to those on the CHMAL will be reviewed by the HMC/PPC. Any such off-CHMAL hazardous materials purchase request must be made with a SEN signed by the cognizant department head.

(4) Purchasing Hazardous Materials.

(a) The CHMAL is the shopping list for the supply division's purchasing of hazardous materials. The items listed in the CHMAL shall be arranged by quantity and calendar quarter. Supply division shall order those hazardous materials required for the divisions using inventory control. That is, prior to each quarter the Supply division shall purchase

those CHMAL items for the upcoming quarter in small enough quantities to use as needed before shelf life expires and avoid long term storage.

- (b) Purchases of hazardous materials by credit card holding supply petty officers will not be tolerated. Any unauthorized purchases of hazardous materials will lead to loss of credit card use privileges.
- (5) Inventory. A continuously updated inventory of hazardous materials shall be maintained by the PPC in the Supply office. The Flammable Storeroom shall remain locked at all times. Access to the Flammable Storeroom shall be limited to the PPC, Supply division personnel, and the HMPOs. The key to the Flammable Storeroom shall be held in the Supply office. HMPOs requiring hazardous materials for maintenance shall retrieve the key from the Supply office, draw the hazardous material from stock, and update the inventory upon returning the key to the Supply office.
- (6) Local Flammable Storage Lockers. Small flammable storage lockers are located in the following spaces:
  - (a) Armory
  - (b) Machine Shop
  - (c) Engine Room
  - (d) ET Shop
  - (e) FT Shop
  - (f) DC Shop
  - (g) Aviation Shop

These lockers are for short term (no longer than one week) storage of hazardous materials that are needed for regular daily maintenance. HMPOs shall monitor the use and contents of these short term hazardous materials storage lockers.

- (7) MUNRO Environmental Working Group. (EWG)
  - (a) The MUNRO EWG shall be an open forum for discussion of cutter implementation of P2 and environmental compliance issues generally. The EWG is chartered to make recommendations for achieving P2 and environmental compliance goals.
  - (b) The PPC shall serve as the team leader for the EWG and shall ensure that the EWG meets at least monthly. The minutes of the EWG shall be published to the Quality Management Board and shall include any EWG P2 and compliance recommendations.
  - (c) The EWG shall endeavor to heighten crew awareness about P2 and environmental compliance by formally recognizing, via the chain of command, individual crew member P2 and environmental compliance initiatives.